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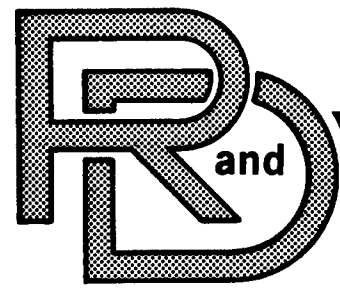


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LABORATORY

TECHNICAL REPORT

NO. 12451



RECAPPED TIRE COMPARISON
17 July, 1979

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20030617188

by JOHN NOWICKE
ALVIN L. HOLTON

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U.S. ARMY TANK-AUTOMOTIVE
RESEARCH AND DEVELOPMENT COMMAND
Warren, Michigan 48090

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ABSTRACT

A test program has been conducted to compare the wear characteristics of conventional retread and precured retread 9:00 X 20 tires. An M-35 2 1/2 ton truck with a 5000# highway load was driven 9000 miles on a combination of paved, secondary and cross country surfaced roads with each type of retread tire in this evaluation. The precured retread tires exhibited about 10% less wear than the conventional retread tires on this test based on sample means. The precured tires were also more consistent in wear resistance.

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OBJECTIVE

The objective of this program was to compare the wear rates of precured retread versus conventional retread military tires.

CONCLUSION

Precured retread tires exhibited greater tread life and more uniform wear properties than tires retreaded by the conventional hot process in this 9000 mile road test comparison program.

ACKNOWLEDGEMENTS

We would like to thank the U.S. Army Tank-Automotive Research and Development Command and in particular, Mr. Nathaniel Carr of the Tank-Automotive Systems Laboratory, Tactical Systems Division, Project Officer. Without his help and counsel, the test would have been delayed much longer.

SUMMARIZED RESULTS

The results of the tire wear tests comparing precured retread with conventional retread tires are summarized below. These results were obtained from the tread depth measurements taken 1" out from both sides of the center rib at six positions on 7 tires of each type.

1. The sample mean wear after the 9000 mile test was 0.304" for precured retread tires and 0.338" for conventional retread tires. (95% significance that precured gives less wear)
2. The sample mean wear for the 7 precured retread tires ranged from 0.232" to 0.350" depending upon measurement location and tire position on the M-35 truck.
3. The sample mean wear for the 7 conventional retread tires ranged from 0.250" to 0.514" at the same measurement locations and tire positions.
4. The rubber hardness was not a significant factor in these tests within the range of accuracy of the durometer measurements (a) no significant difference in hardness between precured and conventional retreads prior to testing (b) no significant change in tire hardness (durometer) as a result of the 9000 mile test. (Note: Tests were run from November through April, not hot weather testing.)

TEST PROCEDURE

A Government supplied M-35 2 1/2 ton truck was pay loaded to 5,000 lbs. (Photo Page 4). Tread depth measurements were taken at 6 equally spaced positions around the tire circumference (every 60°) and at 1 inch out from the center rib, and 1 inch in from the rounded shoulder, both inside and outside exterior surfaces. (Photo Page 5). Tires were inflated to 50 PSI (cold) and rechecked at the end of each 3000 mile cycle.

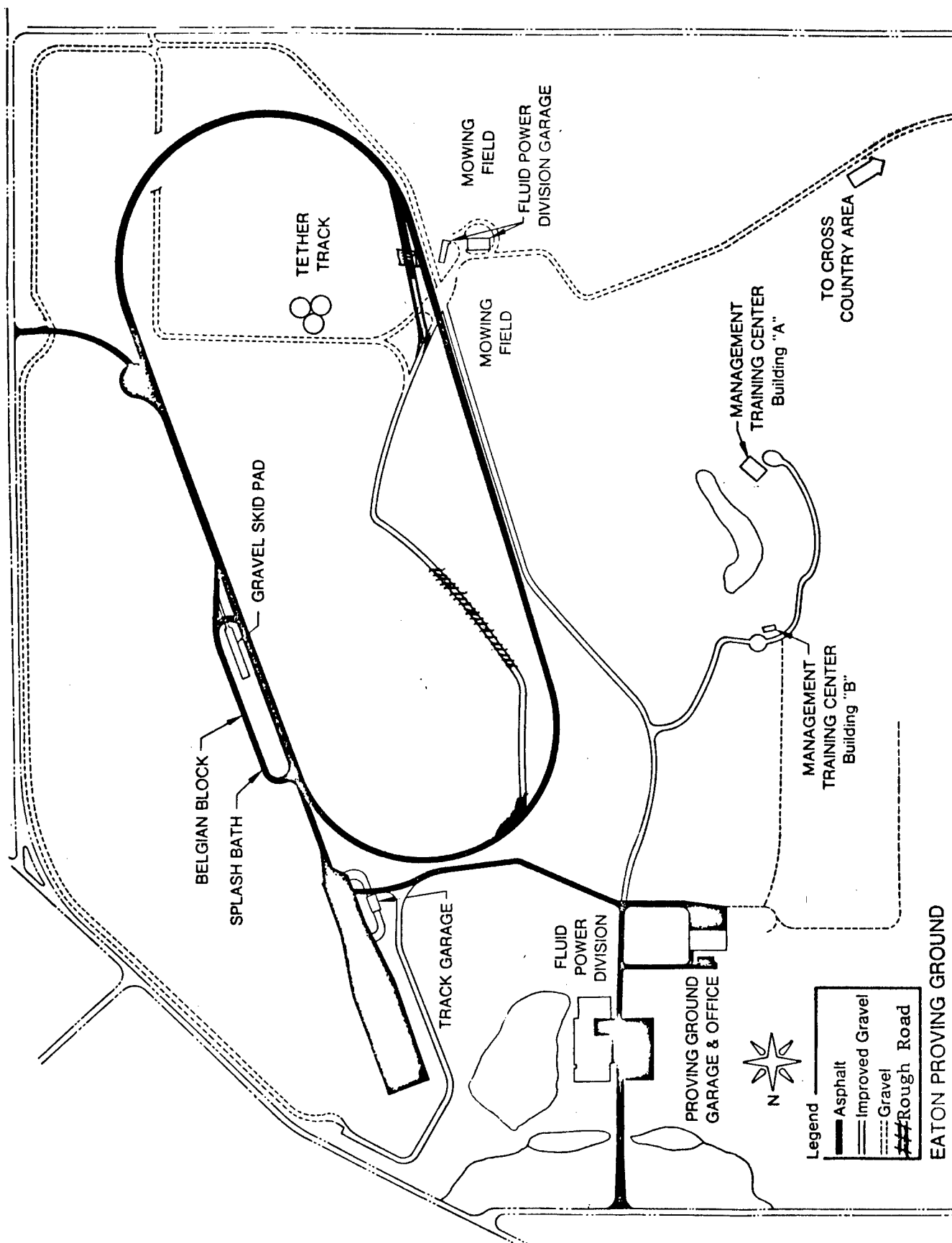
The 3000 mile cycle was divided into 3 parts, 80% hard surface, 15% secondary or gravel and 5% rough cross country with some rocky terrain. (Photo page 6). At the completion of a 3000 mile cycle, the tires were cleaned and the truck was put on a hoist overnight and measurements were taken in the morning. (Photo Page 7). This procedure was repeated each 3000 miles for a total of 9000 miles for each group of tires. The tires were photographed at the beginning and the end of the test.

Precured Retread - Photos Page 8

Conventional Retread - Photos Pages 9 & 10

The test was conducted on Eaton Proving Ground track which consists of a 1.6 mile asphalt oval joining a .5 mile section of improved gravel and cross country road.

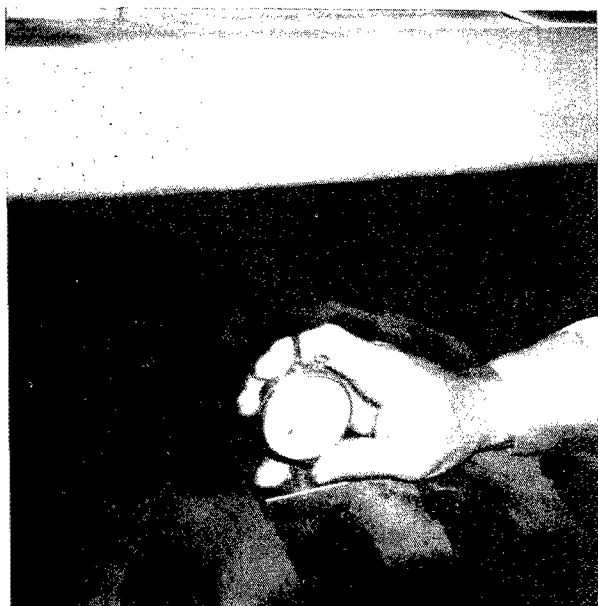
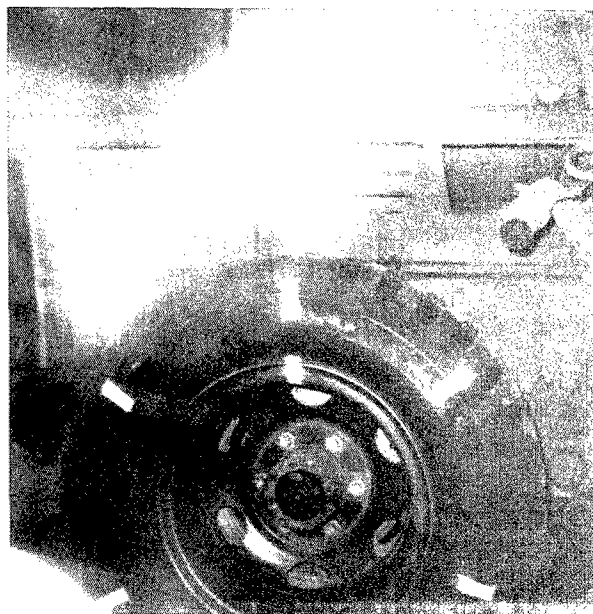
The truck was run on the asphalt oval and would exit on the north turn onto a short section of improved gravel road, then onto the cross country section and back to the improved gravel. The truck would then re-enter the track at the start of the south turn. This course would make up a 1.53 mile loop consisting of 1.03 miles of asphalt, .375 miles of improved gravel, and .125 miles of cross country. The truck was run on this course until the required number of miles on gravel and cross country road were obtained, and then run on the asphalt oval to complete the 3000 miles section of the test. At this point, the truck and tires were washed and put on the hoist. Tire pressure and measurements taken. The map on the following page shows layout of track and gravel and cross country roads.





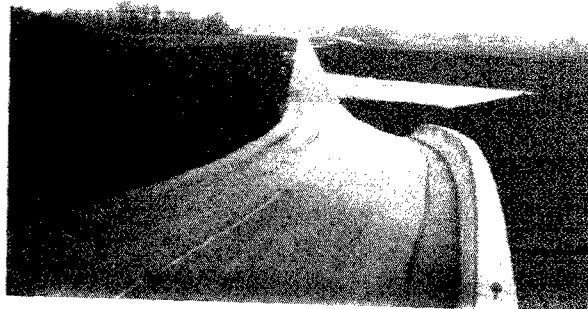
RETREADED TIRE TESTS FOR
COMPARATIVE EVALUATION

TREAD DEPTH MEASUREMENTS WERE TAKEN
AT 6 EVENLY SPACED POSITIONS AROUND
EACH TIRE CIRCUMFERENCE MEASURED AT
1 INCH OUT FROM THE CENTER RIB.



AT 1 INCH IN FROM THE ROUNDED
SHOULDER BOTH INSIDE AND OUTSIDE
EXTERIOR SURFACES. TIRE INFLATION
WAS CHECKED COOL BEFORE EACH RUN
AND AGAIN AT THE COMPLETION OF THE
PAVED RUNS AT THE END OF THE 3000
MILE CYCLE.

EACH 3000 MILE RUN CONSISTED OF 80%
HARD SURFACE (BLACKTOP).

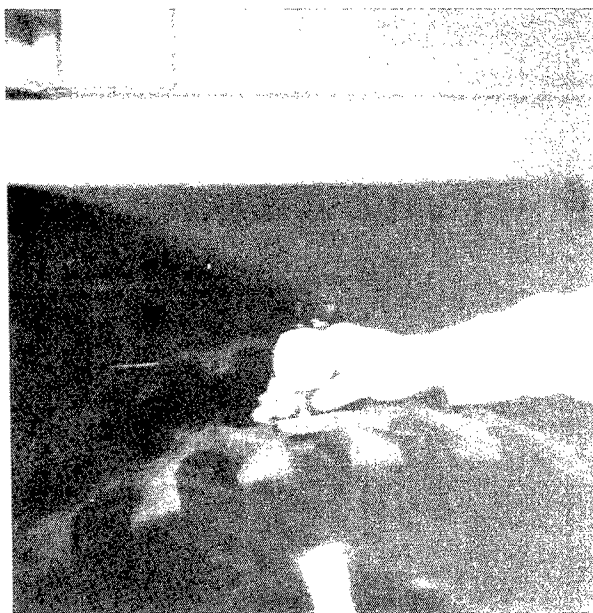


15% SECONDARY ROAD (GRAVEL)

5% ROUGH CROSS COUNTRY
WITH SOME ROCKY TERRAIN.



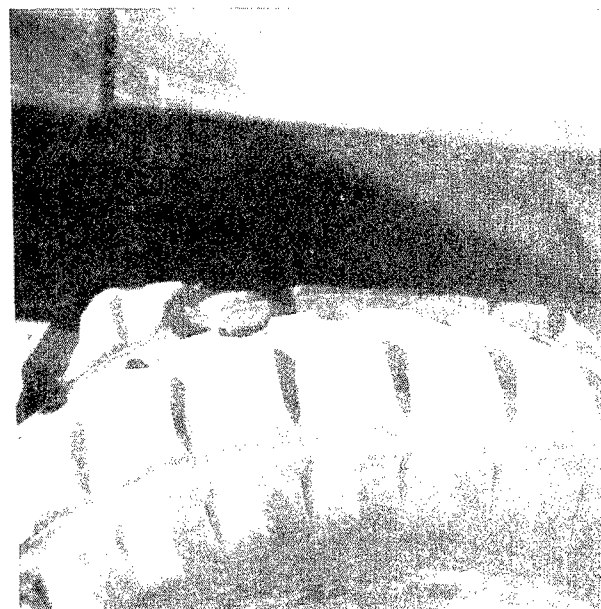
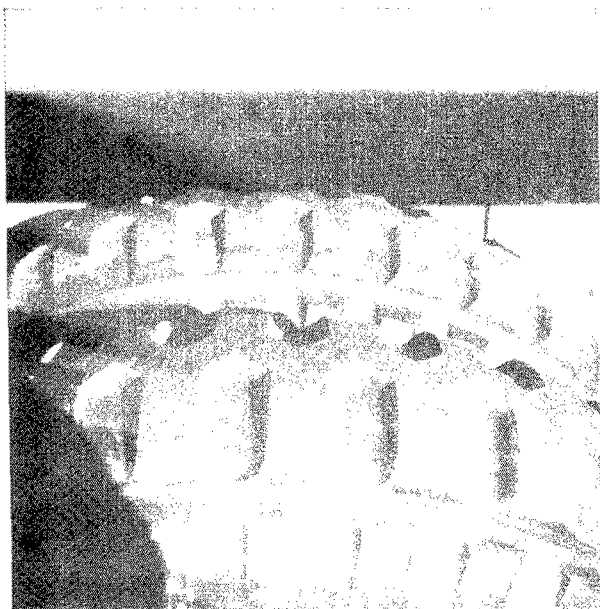
AT THE END OF EACH 3000 MILE RUN, THE TIRES WERE CLEANED, ALLOWED TO COOL TO AMBIENT TEMPERATURE AND MEASURED FOR TREAD DEPTH AS PICTURED. AT THE SAME TIME, TIRE DUROMETER WAS CHECKED.



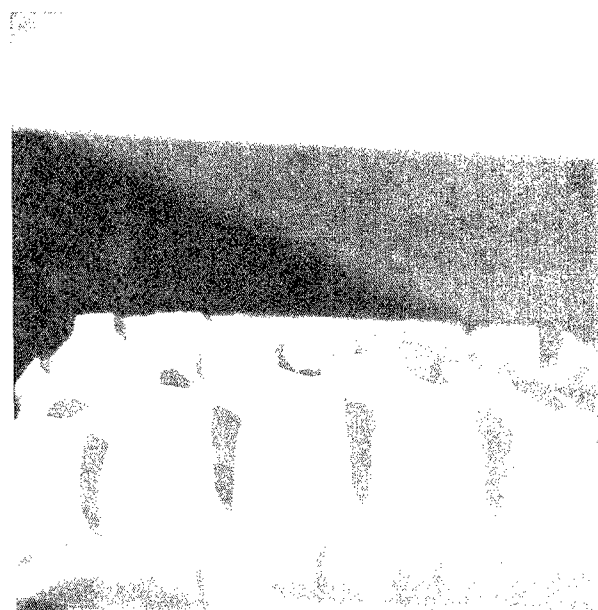
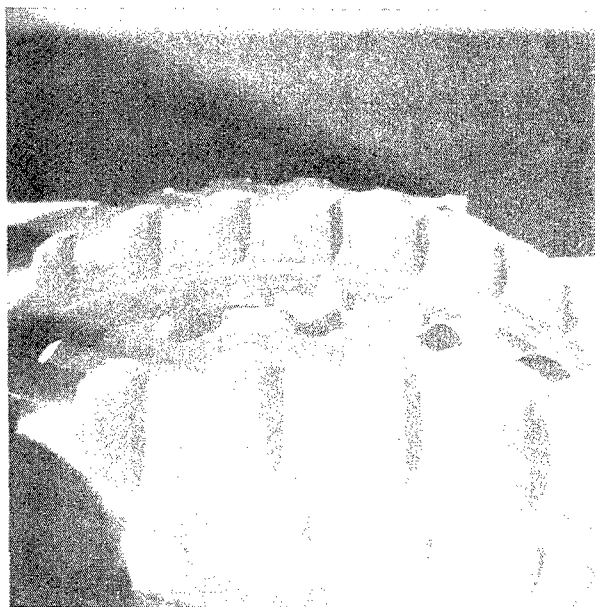
TIRE DEPTH GAUGE



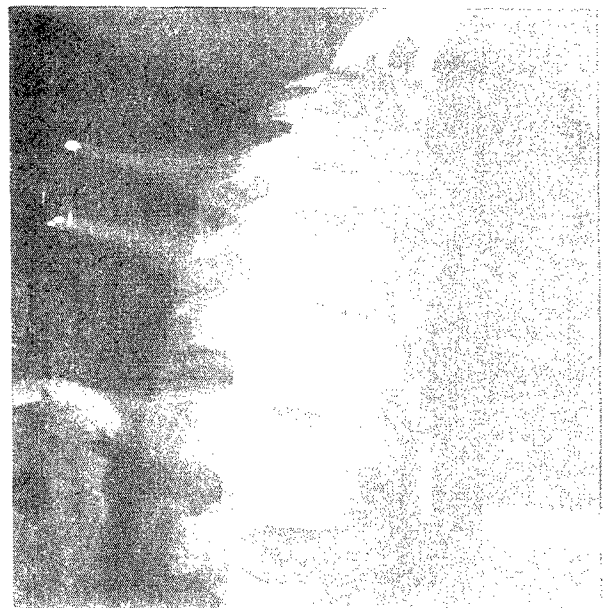
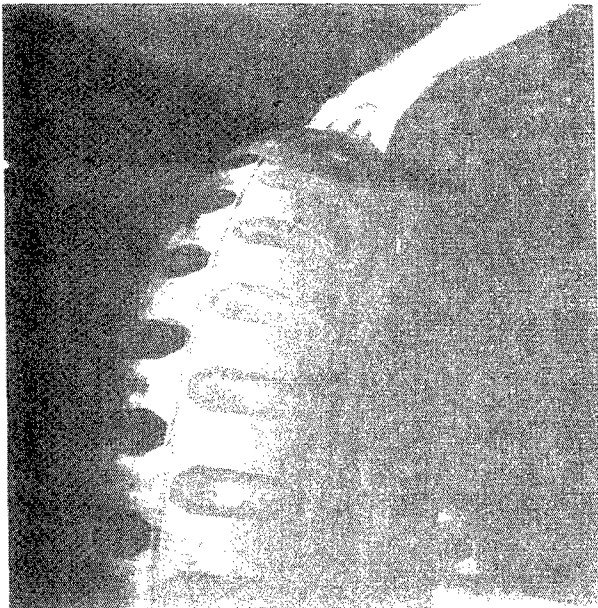
RUBBER DUROMETER GAUGE



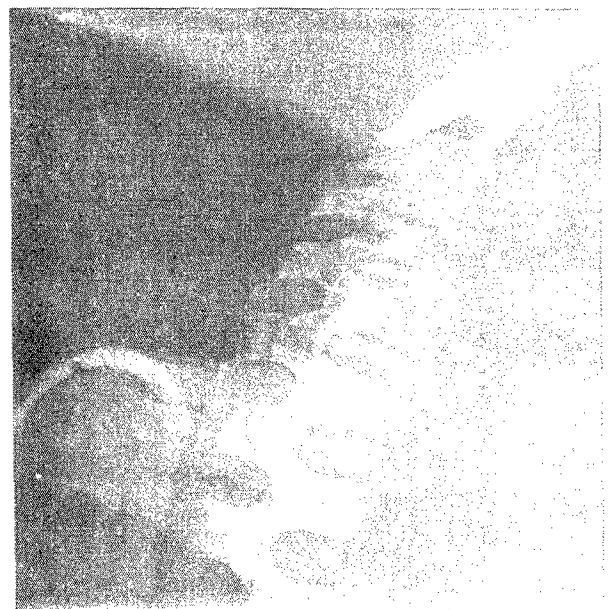
PRECURED RETREADS (COLD CAPS) PRIOR TO TEST #2 AXLE

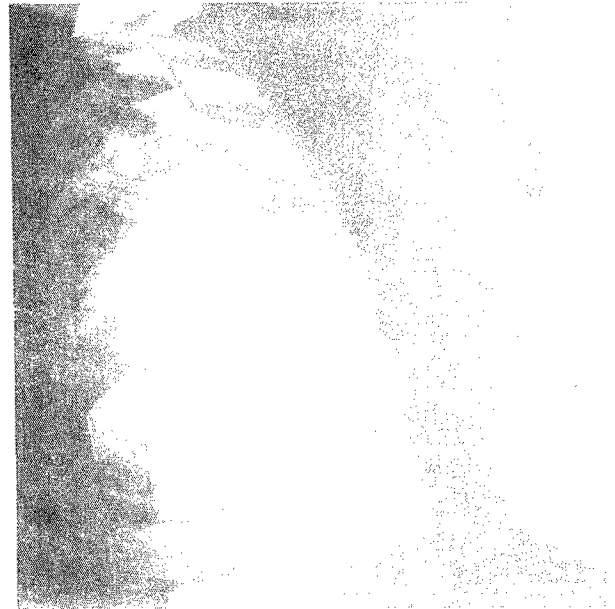
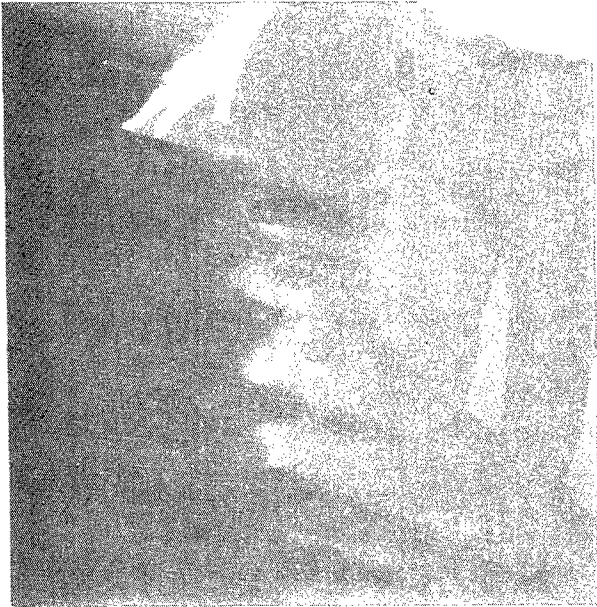


PRECURED RETREADS (COLD CAPS) PRIOR TO TEST #3 AXLE

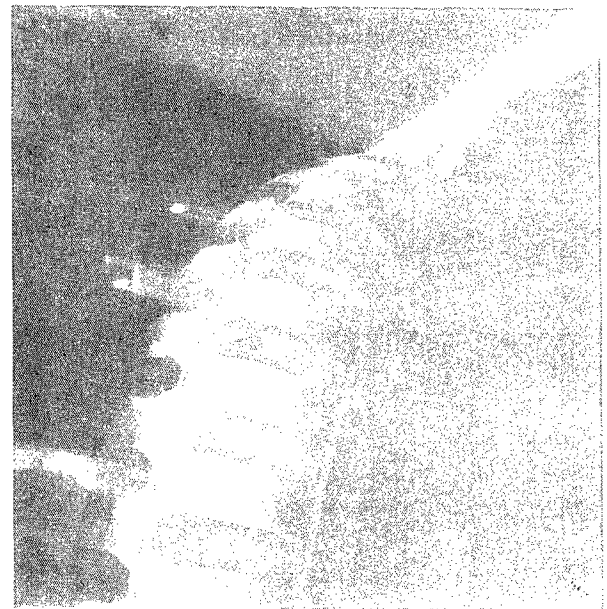
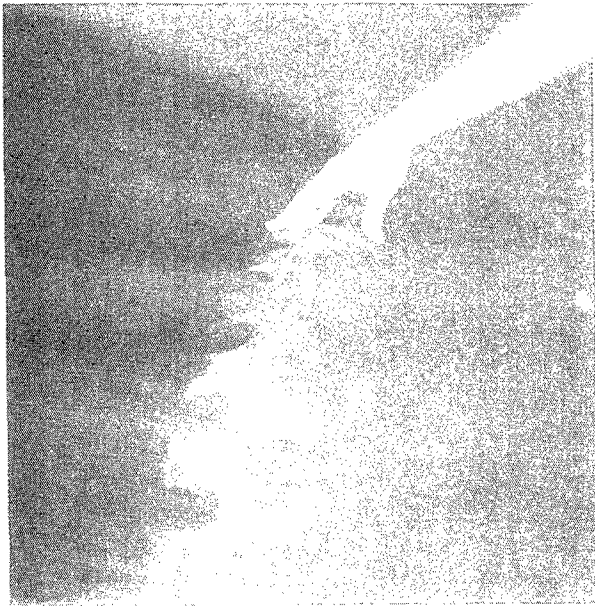


CONVENTIONAL RETREADS (HOT CAPS) PRIOR TO TEST #2 AXLE





CONVENTIONAL RETREADS (HOT CAPS) PRIOR TO TEST #3 AXLE



DISCUSSION

On receipt of the M-35 2 1/2 ton truck, we removed all tires and replaced them with (10) precured type recapped tires that were provided by the Government for test. The truck was then loaded to 5000 lbs. of weights. The tires were inflated to 50 P.S.I. and checked for tread depth per specifications of test.

Following this test preparation, we began the actual test by running the truck over a road consisting of a cross country surface, improved gravel road, and hard surface for a total of 3000 miles. The test tires were then cleaned, allowed to cool to ambient temperature and again measured for tread depth as before. At this time, the front right steering tire showed excessive wear caused by the continuous driving in the counter clockwise direction. Subsequent checks of this tire repeated this wear pattern and possibly voided any use of the test results.

The test pattern above was repeated for two more 3000 mile runs, making a total of 9000 miles, and tread measurements were recorded as before.

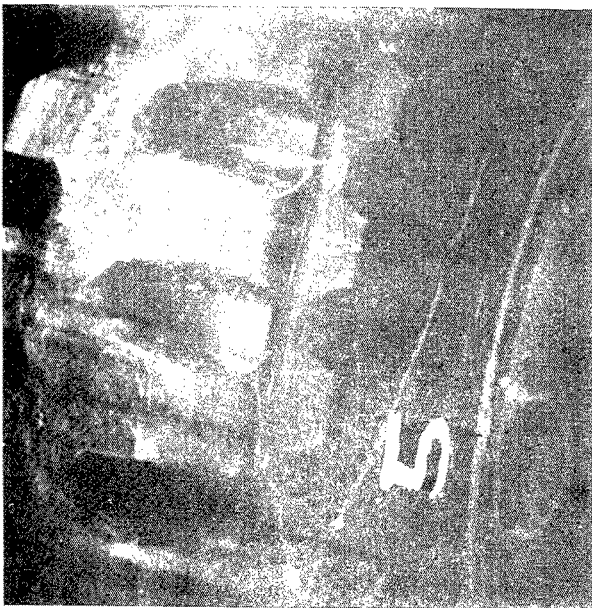
The truck was then parked until the conventionally recapped tires were supplied. We received (10) tires for testing this type retread but when we mounted them on the truck, we found one tire defective. This lead us to put the good tires on the drive wheels only, using other tires for steering, and keeping the one good tire for a spare. This decision proved to be a good one because at the 6000 mile check, tire #5 (axle #2 inside left) was worn out and had to be replaced.

At the conclusion of the three 3000 mile runs, the tires were removed from the truck, identified and stored.

Page No's 12 thru 15 shows photographs of tires at conclusion of test.



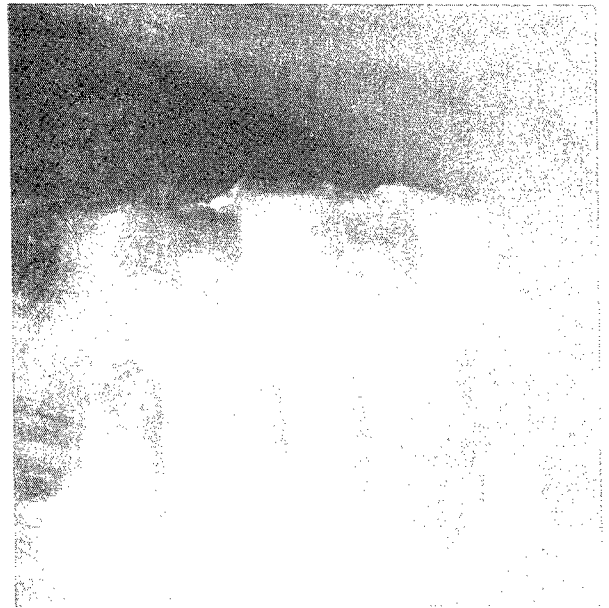
PRECURED RETREADS (COLD CAPS) AFTER TEST #2 AXLE



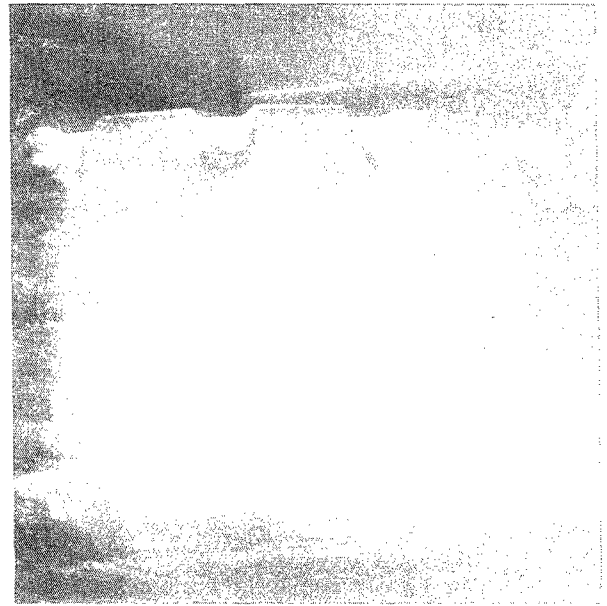


PRECURED RETREADS (COLD CAPS) AFTER TEST #3 AXLE



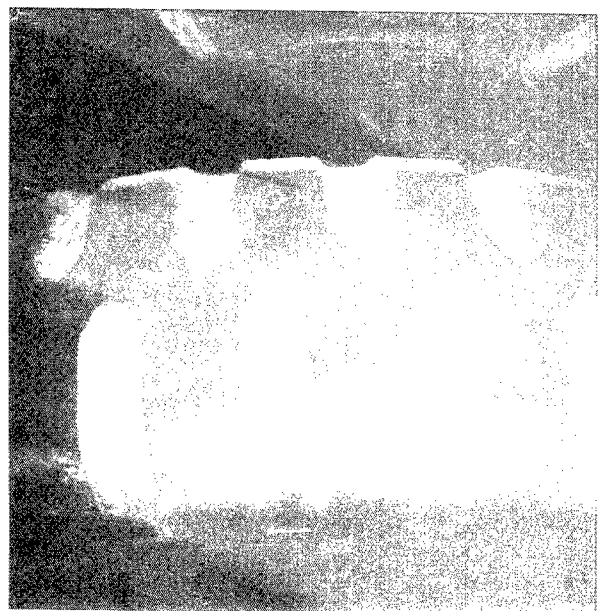
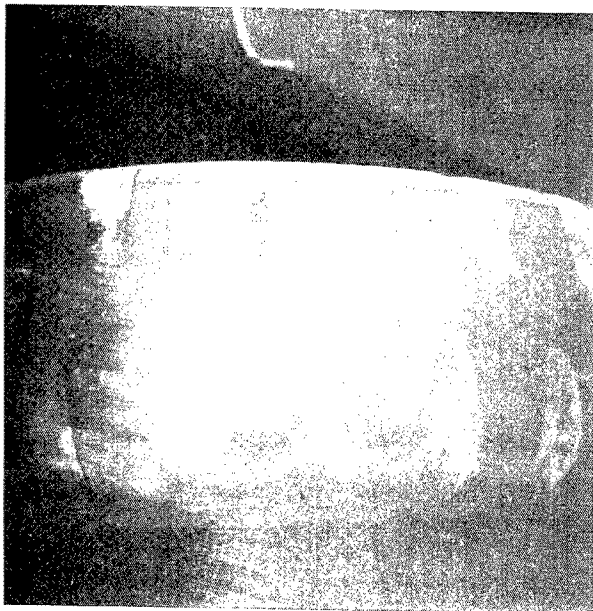


CONVENTIONAL RETREADS (HOT CAPS) AFTER TEST #2 AXLE
(#5 TIRE TERMINATED AT 6000 MI.)





CONVENTIONAL RETREADS (HOT CAPS) AFTER TEST #3 AXLE

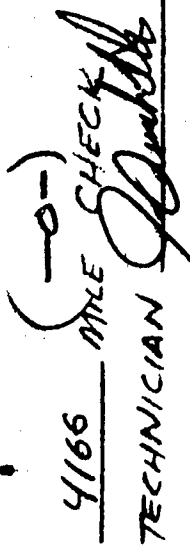


APPENDIX A

Raw Data

DATE: 11-1-20

DEPT. OF THE ARMY



PREPARED RETREAD

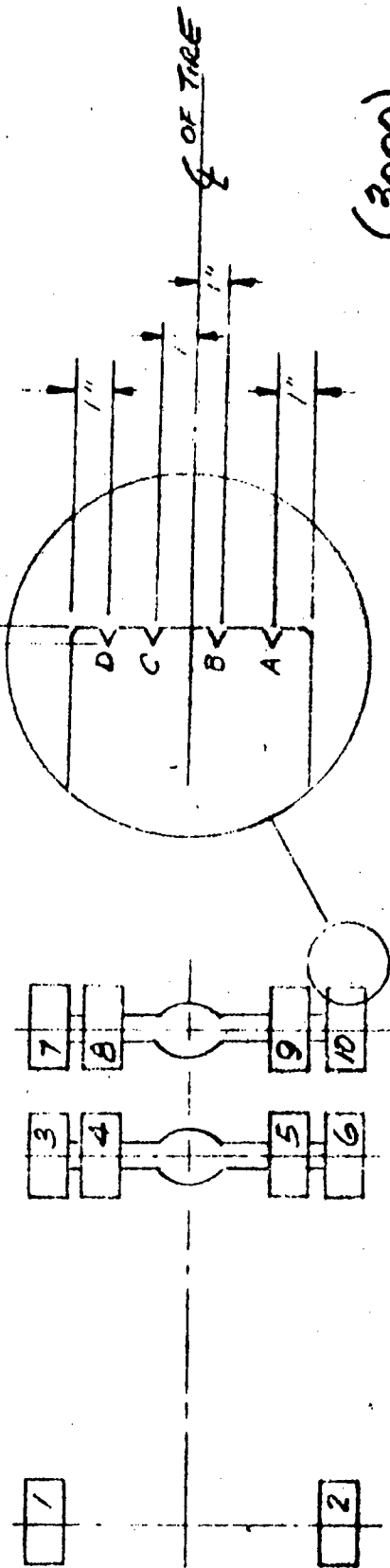
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DATE: 11-27-78

GOVERNMENT FILE #

JOB NO: DAAK30-78-C-0084

DE-TO CE T-LEAD



7191 MILE CHECK (3000)

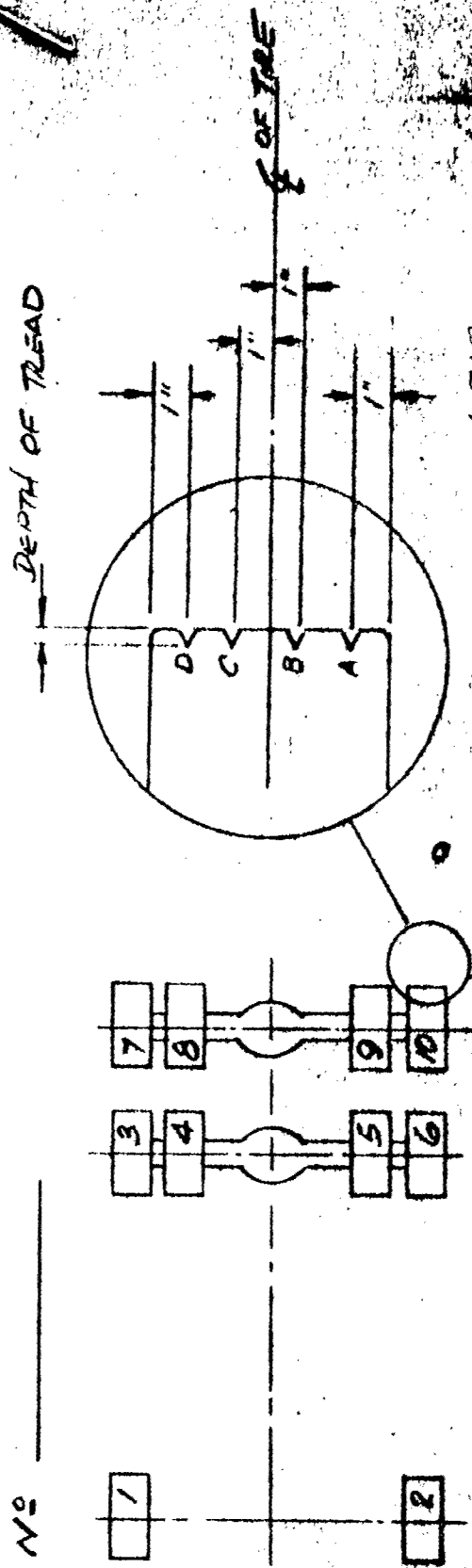
TECHNICIAN Bob Labarnack

QUAL NO
REQ'D

TIME NUMBER	POSITION 1				POSITION 2				POSITION 3				POSITION 4				POSITION 5				POSITION 6			
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60 1	879		843	719	890	835	860	864	873	730	870	905	780	878		920	787	910					833	790
60 2	720	847	857	645	747	842	853	640	715	838	865	647	683	839	620	798	844	848	612	775	811	840	635	
61 3	516	613	605	495	500	611	580	500	534	625	585	490	550	600	595	490	558	611	643	520	557	648	605	502
60 4	500	623	600	490	502	625	600	505	500	600	590	505	495	613	612	485	495	580	581	490	475	575	560	473
62 5	517	582	622	630	507	597	636	540	542	540	575	563	524	572	645	516	505	600	625	500	510	581	595	491
61 6	527	614	586	520	527	627	583	541	524	611	575	500	510	623	573	519	491	617	570	511	490	628	557	509
60 7	560	640	637	528	561	649	627	500	538	677	657	529	551	661	660	528	544	648	647	505	540	640	662	519
61 8	510	605	600	593	533	575	582	523	545	591	602	512	545	612	607	510	573	645	619	534	520	620	510	605
60 9	504	620	601	535	486	611	600	521	485	645	578	545	483	620	579	522	484	569	571	532	481	619	569	540
60 10	550	628	582	518	550	690	591	522	550	649	603	519	542	642	591	507	550	687	588	510	571	600	626	520

Job No: _____

DATE: 12-14-78



PRECURED RETREAD
(FRONT TIRE REPLACED)

10718.6 MILE CHECK

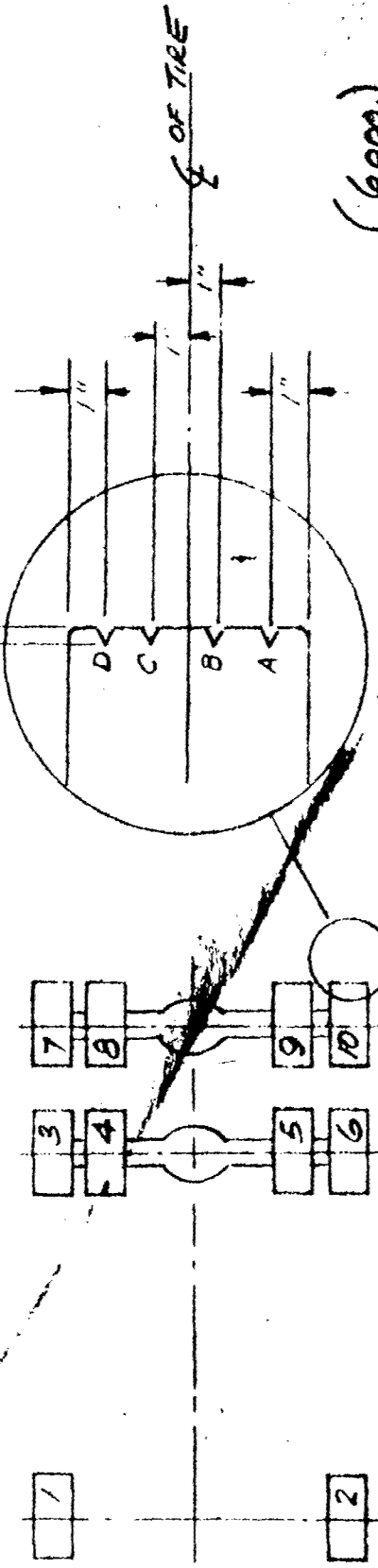
TECHNICIAN C. BROWN

[illegible]

PERMANENT TIRE TEST
 JOB NO DAAK 30-78-C-0084

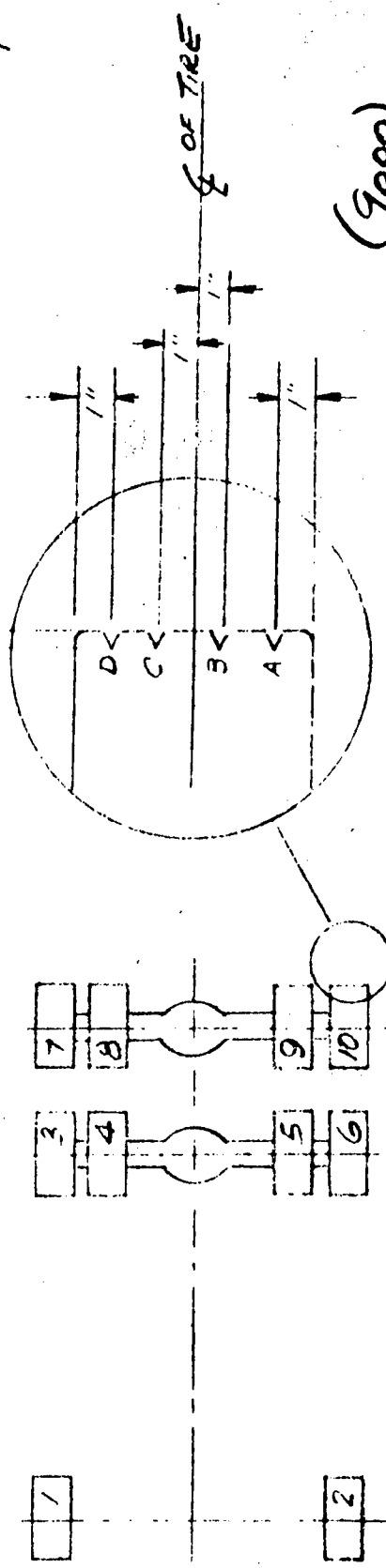
DATE 12/14/78

DEPTH OF TREAD



(6000.)
 10718-6 MILE CHECK
 TECHNICIAN C. Brown

TIRE NUMBER	POSITION 1				POSITION 2				POSITION 3				POSITION 4				POSITION 5				POSITION 6			
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1			9 97	6 40			8 70	6 10			9 95	6 60			8 50	6 00			8 50	6 10				
2	6 31	7 35	7 12	6 32	6 27	7 39	7 20	6 20	6 07	7 20	7 32	6 35	6 08	7 21	7 49	6 87	6 16	7 11	7 24	6 00	6 71	7 02	6 11	6 89
3	6 30	7 34	7 59	6 45	6 20	6 71	6 20	6 71	6 20	6 71	6 20	6 71	6 20	6 20	6 71	6 20	6 71	6 20	6 71	6 20	6 71	6 20	6 71	6 20
4	5 31	6 35	6 80	5 71	5 33	6 36	6 25	5 53	6 20	6 85	7 48	6 28	5 37	6 01	7 28	6 08	5 46	6 19	7 17	6 28	6 67	5 11	6 00	7 00
5	5 30	6 30	6 30	5 30	6 30	6 30	6 30	5 30	6 30	6 30	6 30	6 30	5 30	6 30	6 30	6 30	6 30	6 30	6 30	6 30	6 30	6 30	6 30	6 30
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10	4 91	6 91	6 91	6 91	6 91	6 91	6 91	6 91	6 91	6 91	6 91	6 91	6 91	6 91	6 91	6 91	6 91	6 91	6 91	6 91	6 91	6 91	6 91	6 91



13224.0 MILE CHECK
(9000)
TECHNICIAN C BROWN

TIRE NUMBER	POSITION 1				POSITION 2				POSITION 3				POSITION 4				POSITION 5				POSITION 6			
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
1 63	860	840	761	617	977	843	891	630	832	815	770	615	835	827	662	601	878	783	753	675	839	814	737	603
2 62	580	580	620	548	572	586	601	551	562	526	591	552	584	585	595	542	590	599	602	578	551	592	581	602
3 62	610	610	608	608	650	610	615	615	615	615	615	615	615	615	615	615	615	615	615	615	615	615	615	615
4 60	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620
5 63	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620
6 62	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620
7 62	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620
8 62	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620
9 63	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620
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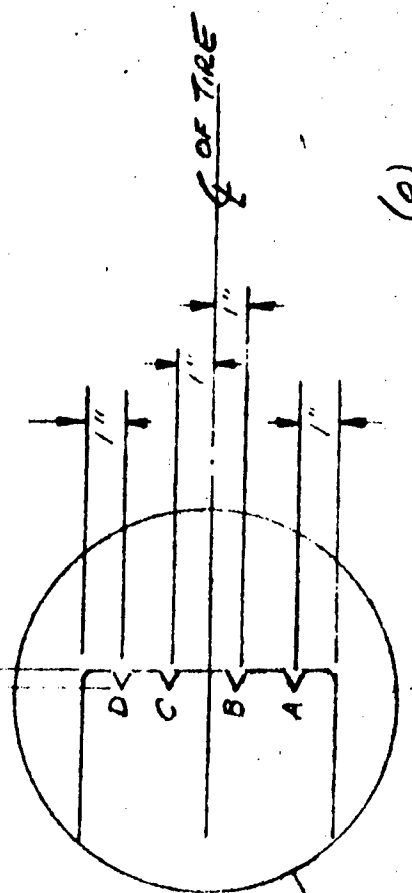
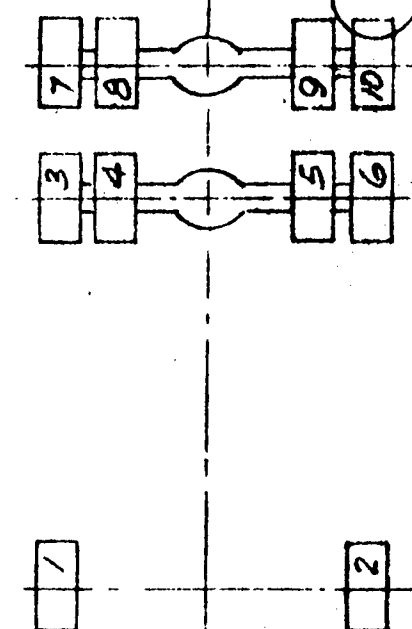
GOVERNMENT TIRE TEST

DATE: 2/2/77

JOB NO DAAK30-78-C-0084

DEPTH OF TREAD

1



(gauge)
HARDNESS

13224-1 MILE CHECK
(0)

TECHNICIAN C BRANCH

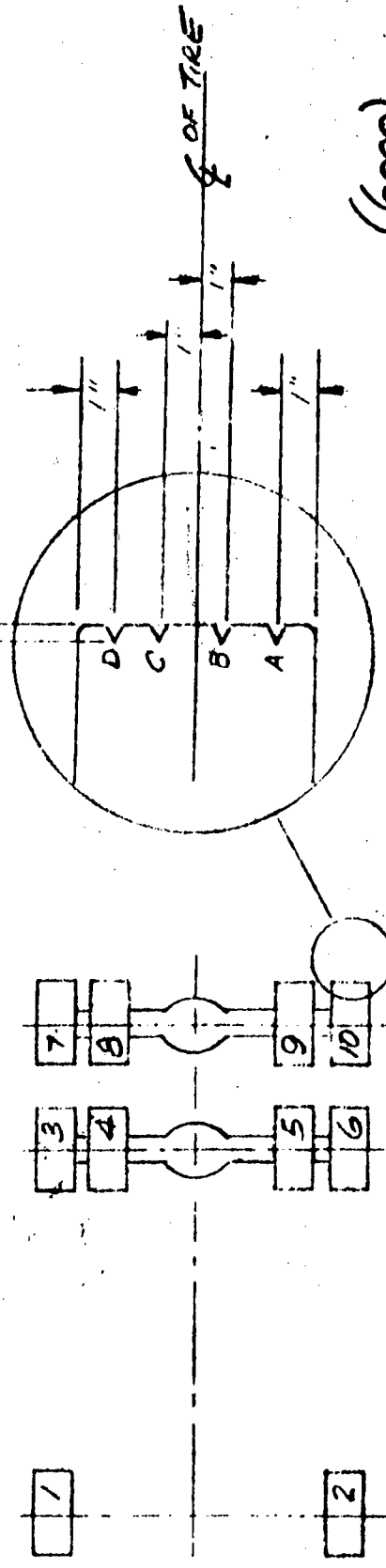
CONVENTIONAL RETREAD

TIRE NUMBER	POSITION 1				POSITION 2				POSITION 3				POSITION 4				POSITION 5				POSITION 6			
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
✓ 1 65	596	444	451	475	487	445	452	497	470	442	460	480	486	465	451	477	494	450	457	480	460	455	460	477
✓ 2 70	485	470	455	485	483	440	460	480	472	471	450	472	473	460	465	466	470	466	466	485	463	465	457	484
✓ 3 65	425	438	434	440	461	443	430	433	457	440	430	433	483	440	476	433	440	434	439	431	470	432	434	427
✓ 4 60	400	400	400	490	377	401	409	412	460	422	407	407	410	404	409	407	400	409	400	400	402	400	404	410
5 65	498	412	407	460	470	420	405	440	504	430	415	425	465	430	410	435	490	405	403	435	487	435	411	440
✓ 6 65	501	487	494	401	505	490	495	405	490	495	445	480	427	470	400	400	490	376	385	390	465	380	385	385
✓ 7 60	427	430	424	420	440	430	430	412	450	451	415	440	430	424	425	420	440	440	423	427	442	436	420	432
✓ 8 60	422	435	425	440	433	437	425	445	470	470	414	425	445	421	470	440	460	445	424	450	455	430	437	446
✓ 9 60	422	404	390	396	415	406	409	409	495	406	411	396	430	400	400	400	407	404	400	396	410	404	404	404
✓ 10 60	441	436	424	402	440	438	445	413	491	401	475	460	411	414	400	400	404	435	421	420	432	436	415	415

GOVERNMENT TIRE TEST
JOB NO: DAAK30-78-C-0084

DATE: 3-27-79

DEPTH OF TREAD



1929109 MILE CHECK

KNOWLEDGE CONVENTIONAL RETREAD

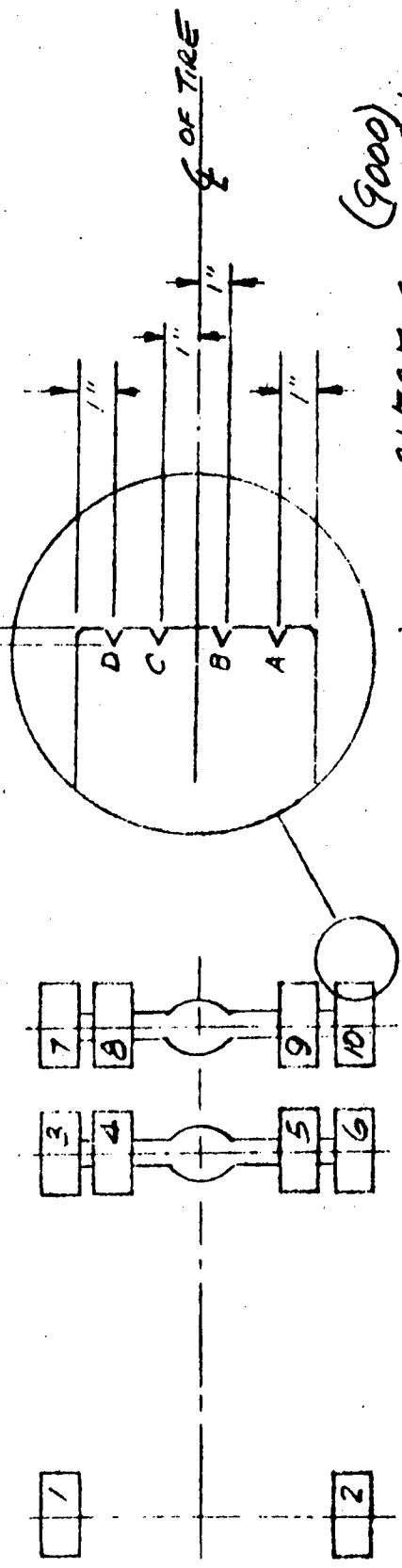
TECHNICIAN C. B. BROWN

TIRE NUMBER	POSITION 1				POSITION 2				POSITION 3				POSITION 4				POSITION 5				POSITION 6			
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
1																								
2																								
3	51°	63°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°
4	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°
5	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°
6	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°
7	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°
8	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°
9	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°
10	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°	51°

DATE: 4-30-87

GOVERNMENT TIRE TEST
JOB NO DAAR30-78-C-0084

DEPTH OF TREAD



(9000)
21797.5 MILE CHECK
TECHNICIAN C. BROWN

CONVENTIONAL RETREAD

Hardness

TIRE NUMBER	POSITION 1				POSITION 2				POSITION 3				POSITION 4				POSITION 5				POSITION 6			
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
1 60																								
2 60																								
✓ 3 60	107	124	136	122	102	100	103	109	125	136	140	136	161	193	190	150	152	168	193	161	135	180	193	150
✓ 4 55	100	102	100	102	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
5 60																								
✓ 6 60	107	111	111	111	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107
✓ 7 60	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107
✓ 8 65	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107
✓ 9 60	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107
✓ 10 55	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107

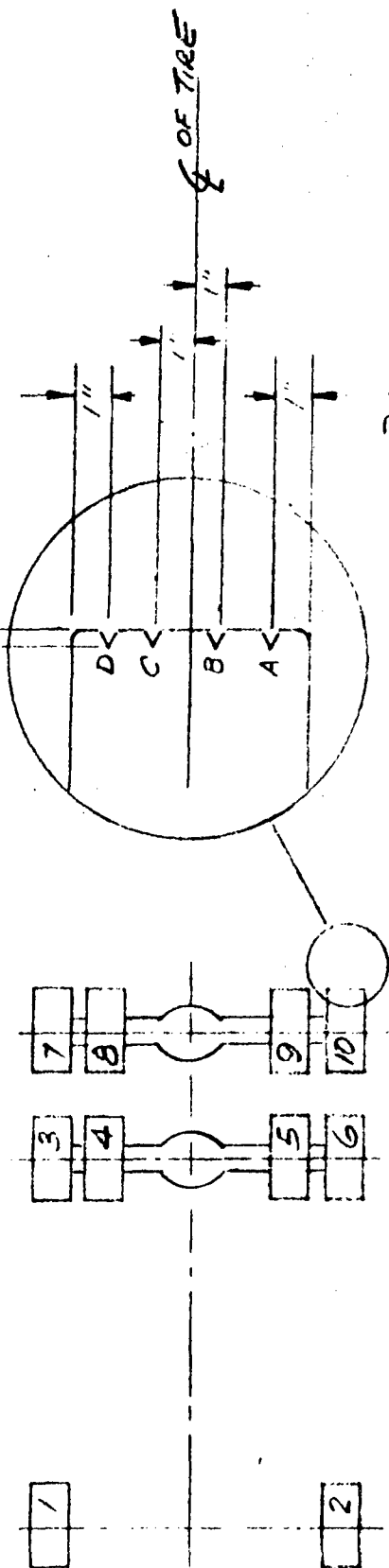
APPENDIX B

Reduced Data

GOVERNMENT TIRE TEST
JOB NO 2001

DATE: _____

DEPTH OF TREAD



3000 MILE CHECK

TECHNICIAN C. BROWN

TIRE WEAR

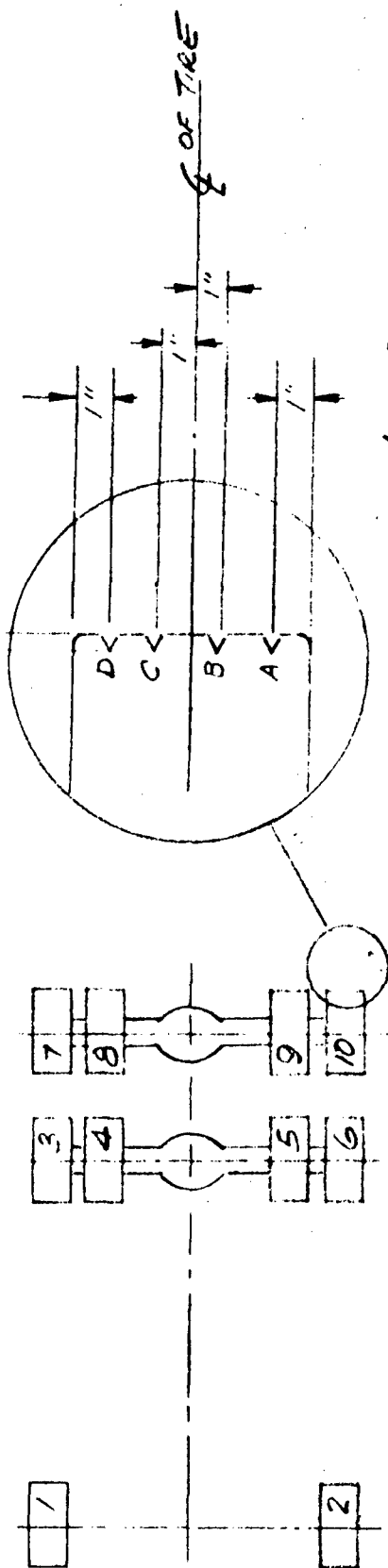
Prepared Retread

TIRE NUMBER	POSITION 1				POSITION 2				POSITION 3				POSITION 4				POSITION 5				POSITION 6			
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
1																								
2																								
3		.170	.180			.188	.167			.163	.145			.174	.149			.163	.179			.204	.182	
4		.158	.160			.167	.162			.120	.122			.155	.152			.97	.112			.104	.085	
5		.137	.177			.137	.192			.105	.103			.117	.178			.174	.192			.108	.145	
6		.162	.154			.175	.136			.163	.103			.159	.108			.164	.118			.187	.123	
7		.185	.162			.189	.169			.197	.172			.189	.191			.167	.193			.155	.178	
8		.153	.123			.144	.161			.169	.189			.172	.175			.205	.177			.176	.083	
9		.168	.124			.155	.124			.212	.152			.201	.118			.146	.115			.169	.089	
10		.169	.142			.227	.117			.177	.159			.164	.151			.215	.145			.188	.166	

GOVERNMENT TIRE TEST
JOB NO 2001

DATE: _____

DEPT OF READ



6000 MILE CHECK
TECHNICIAN C. BROWN

Tire wear

Procured Retread

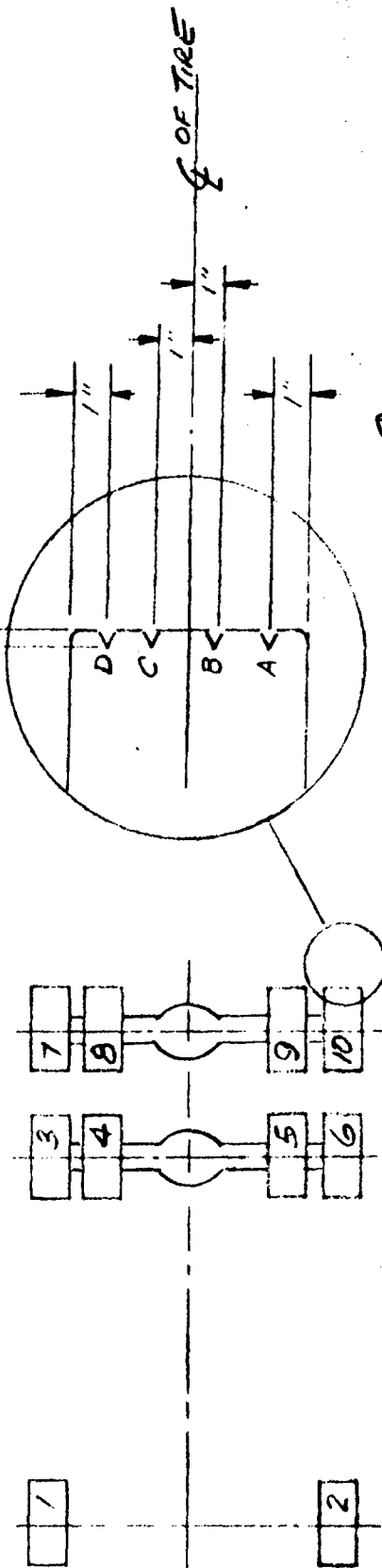
TIRE NUMBER	POSITION 1				POSITION 2				POSITION 3				POSITION 4				POSITION 5				POSITION 6			
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
1																								
2																								
3																								
4																								
5																								
6																								
7																								
8																								
9																								
10																								

GOVERNMENT TIRE TEST

JOB NO 2001

DATE:

DEPTH OF TREAD



9000 MILE CHECK
TECHNICIAN C. BROWN

Tire Wear

Prepared Retread

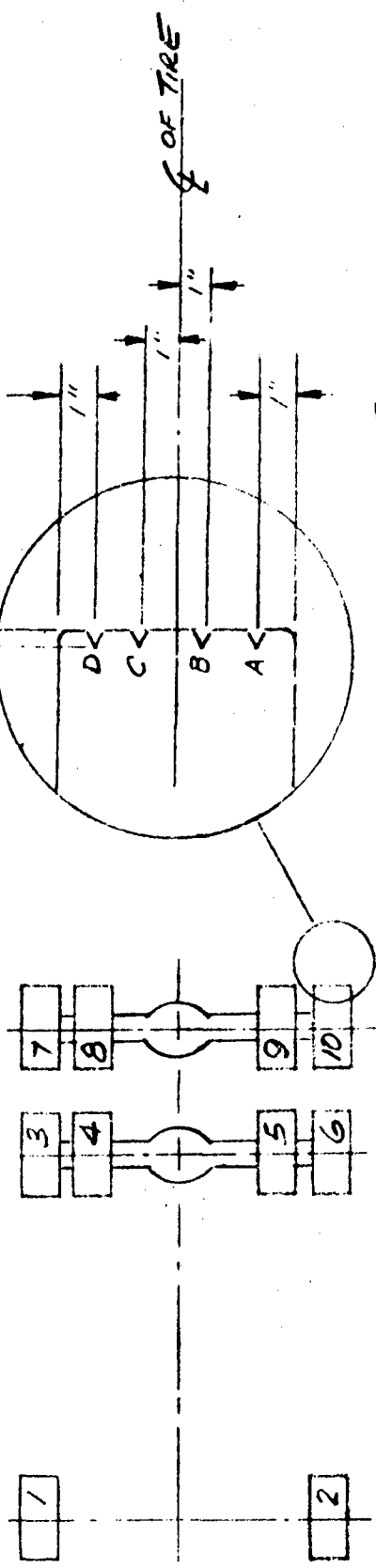
TIRE NUMBER	POSITION 1				POSITION 2				POSITION 3				POSITION 4				POSITION 5				POSITION 6			
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
1																								
2																								
3		327	357			389	352			325	345			357	311			357	311			343	301	
4		245	250			282	292			235	214			240	189			256	211			279	235	
5		292	360			187	411			219	360			236	333			278	348			277	446	
6		283	298			314	270			293	247			296	260			302	271			327	279	
7		345	307			345	301			333	313			329	339			325	345			308	312	
8		249	283			341	329			320	369			317	369			300	357			263	363	
9		283	338			295	241			283	285			325	259			366	259			310	280	
10		349	320			380	283			350	311			302	305			340	291			351	339	

GOVERNMENT TIRE TEST

JOB NO 200

DATE:

DEPTH OF TREAD



3000 MILE CHECK

TECHNICIAN C. BROWN

TIRE WEAR

CONVENTIONAL RETREAD

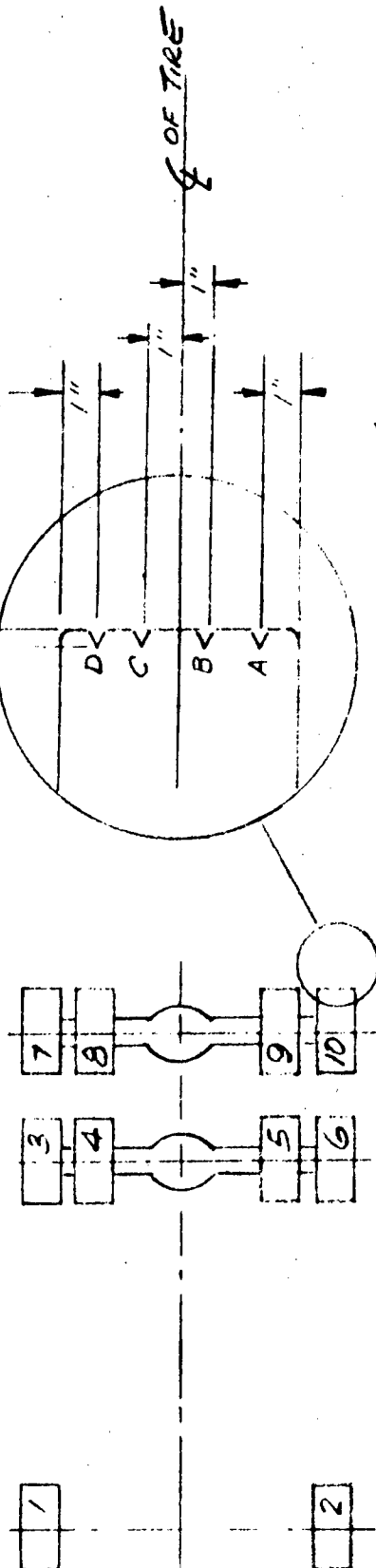
TIRE NUMBER	POSITION 1			POSITION 2			POSITION 3			POSITION 4			POSITION 5			POSITION 6		
	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
1																		
2																		
3		.121	.136		.137	.100		.139	.091		.124	.112		.127	.093		.113	.097
4		.145	.105		.144	.121		.121	.114		.126	.139		.115	.132		.134	.117
5		.105	.298		.225	.298		.224	.286		.223	.277		.206	.302		.239	.252
6		.032	.076		.019	.114		.060	.111		.055	.181		.174	.184		.169	.191
7		.148	.091		.150	.092		.115	.092		.155	.087		.139	.110		.154	.110
8		.123	.125		.138	.147		.135	.143		.140	.122		.144	.078		.122	.129
9		.191	.170		.198	.184		.207	.177		.206	.201		.187	.193		.189	.146
10		.092	.109		.094	.094		.104	.086		.104	.077		.107	.080		.101	.089

GOVERNMENT TIRE TEST

JOB NO 2001

DATE: _____

DEPTH OF TREAD



6000 MILE CHECK

TECHNICIAN C. BROWN

TIRE WEAR

CONVENTIONAL RETREAD

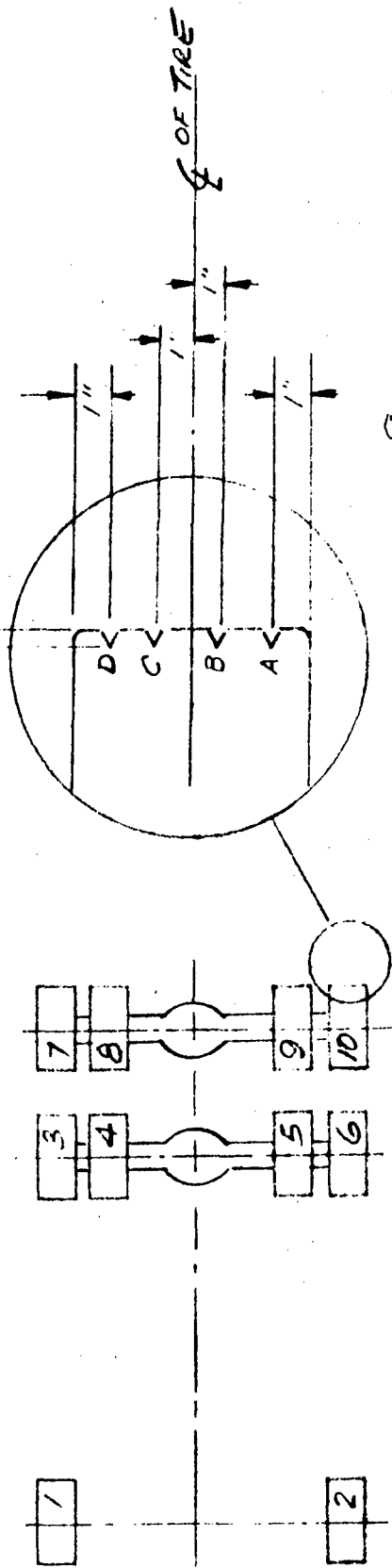
TIRE NUMBER	POSITION 1				POSITION 2				POSITION 3				POSITION 4				POSITION 5				POSITION 6			
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
1																								
2																								
3	.194	.211			.161	.203			.163	.179			.190	.193			.197	.192			.200	.197		
4	.220	.185			.208	.176			.182	.190			.190	.192			.189	.229			.224	.189		
5	.558	.593			.560	.589			.550	.566			.569	.570			.570	.580			.546	.570		
6	.320	.374			.301	.396			.320	.378			.333	.463			.484	.485			.467	.446		
7	.270	.187			.261	.199			.271	.222			.278	.216			.254	.162			.240	.157		
8	.201	.209			.198	.211			.215	.178			.222	.216			.194	.221			.212	.217		
9	.383	.380			.393	.397			.394	.389			.392	.407			.392	.387			.377	.387		
10	.206	.183			.184	.180			.201	.168			.227	.157			.209	.155			.201	.197		

GOVERNMENT TIRE TEST

VOB NO 2001

DATE:

DEPTH OF TREAD



9000 MILE CHECK
TECHNICIAN C. BROWN

CONVENTIONAL RETREAD

TIRE NUMBER	POSITION 1				POSITION 2				POSITION 3				POSITION 4				POSITION 5				POSITION 6			
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
1																								
2																								
3		.269	.270			.259	.278			.256	.260			.253	.294			.246	.240			.248	.259	
4		.20	.252			.289	.234			.263	.268			.273	.281			.235	.277			.244	.256	
5																								
6		.359	.483			.412	.490			.415	.485			.435	.523			.541	.575			.532	.626	
7		.352	.492			.342	.267			.304	.225			.343	.133			.360	.304			.374	.299	
8		.284	.291			.267	.281			.291	.281			.299	.138			.265	.185			.284	.268	
9		.496	.516			.530	.524			.534	.506			.528	.332			.501	.496			.495	.496	
10		.274	.266			.277	.255			.268	.235			.189	.245			.298	.244			.276	.255	

APPENDIX C

Statistical Analysis

CONCLUSIONS

With the premise that we have identical driving cycles for the test of precured retread and conventional retread tires, the following conclusions can be drawn from the 9000 mile data.

- a) In overall performance, the precured retread tire has less wear compared with conventional retread tire.
- b) In overall performance, the precured retread tire has a much more uniform wear compared with the conventional retread tire.

Note: Some individual precured retread tires have more wear when compared with conventional retread tires.

RESULTS

- a) The wear comparison between precured retread tire and conventional retread tire is as follows (see Appendix (a1) - (a6)):

		Precured Retread	Conventional Retread
Wear Measurements	Sample Mean	.304	.338
	Sample Std. Dev.	.042	.107
	Distribution	Normal	N/A
	Sample Size	84	84
The hypothesis that precured retread tire has less wear compared with conventional retread tire cannot be rejected at 95% significance level.			

- b) The wear comparison at point B between precured retread tire and conventional retread tire is as follows (see Appendix (b1) - (b5)):

		Precured Tires	Conventional Tires
Wear Measurements	Sample Mean	.313	.340
	Sample Std. Dev.	.038	.099
	Distribution	Normal	N/A
	Sample Size	42	42
The hypothesis that at point B precured retread tire has less wear compared with conventional retread tire cannot be accepted at 95% significance level.			

- c) The wear comparison at point C between precured retread tire and conventional retread tire is as follows (see Appendix (C1) - (C5)):

		Precured Retread	Conventional Retread
Wear Measurements	Sample Mean	.295	.335
	Sample Std. Dev.	.045	.114
	Distribution	Normal	N/A
	Sample Size	42	42
The hypothesis that at point C precured retread tire has less wear compared with conventional retread tire cannot be rejected at 95% significance level.			

- d) The wear comparison between precured and conventional retread tires for individual tire positions (see appendix (d1)-(g3)).

		Wear Measurements					
Tire Position	Point	Sample Mean		Sample Std. Dev.		Comparison	
		Precured Retread	Conventional Retread	Precured Retread	Conventional Retread	Precured Retread	Conventional Retread
3	B	.350	.255	.022	.008	0	*1
	C	.330	.268	.022	.015	0	*
4	B	.256	.272	.018	.021	N/A	N/A
	C	.232	.261	.033	.016	N/A	N/A
6	B	.303	.449	.014	.066	*	0
	C	.271	.514	.016	.032	*	0
7	B	.331	.346	.013	.022	N/A	N/A
	C	.320	.270	.016	.031	0	*
8	B	.298	.281	.032	.012	N/A	N/A
	C	.345	.274	.031	.018	0	*
9	B	.310	.511	.029	.021	*	0
	C	.260	.512	.018	.014	*	0
10	B	.345	.264	.023	.035	0	*
	C	.308	.250	.018	.010	0	*
Note: The hypothesis that * designated tire has less wear comparing with 0 designated tire can not be rejected at 95% significance level.							

- e) Comparing with precured retread tires, conventional retread tires had slightly less wear at tire position 3, 7, 8 and 10, however, it experiences much more wear at tire position 5, 6 and 9.
- f) Conventional retread tires experienced significantly more wear at position 5, 6 and 9 compared with the rest.

Note: The comparisons in (a)-(c) do not include data for tire 5.

Appendix

(a1) The wear measurements (file TEMP) for all precured retread tires.

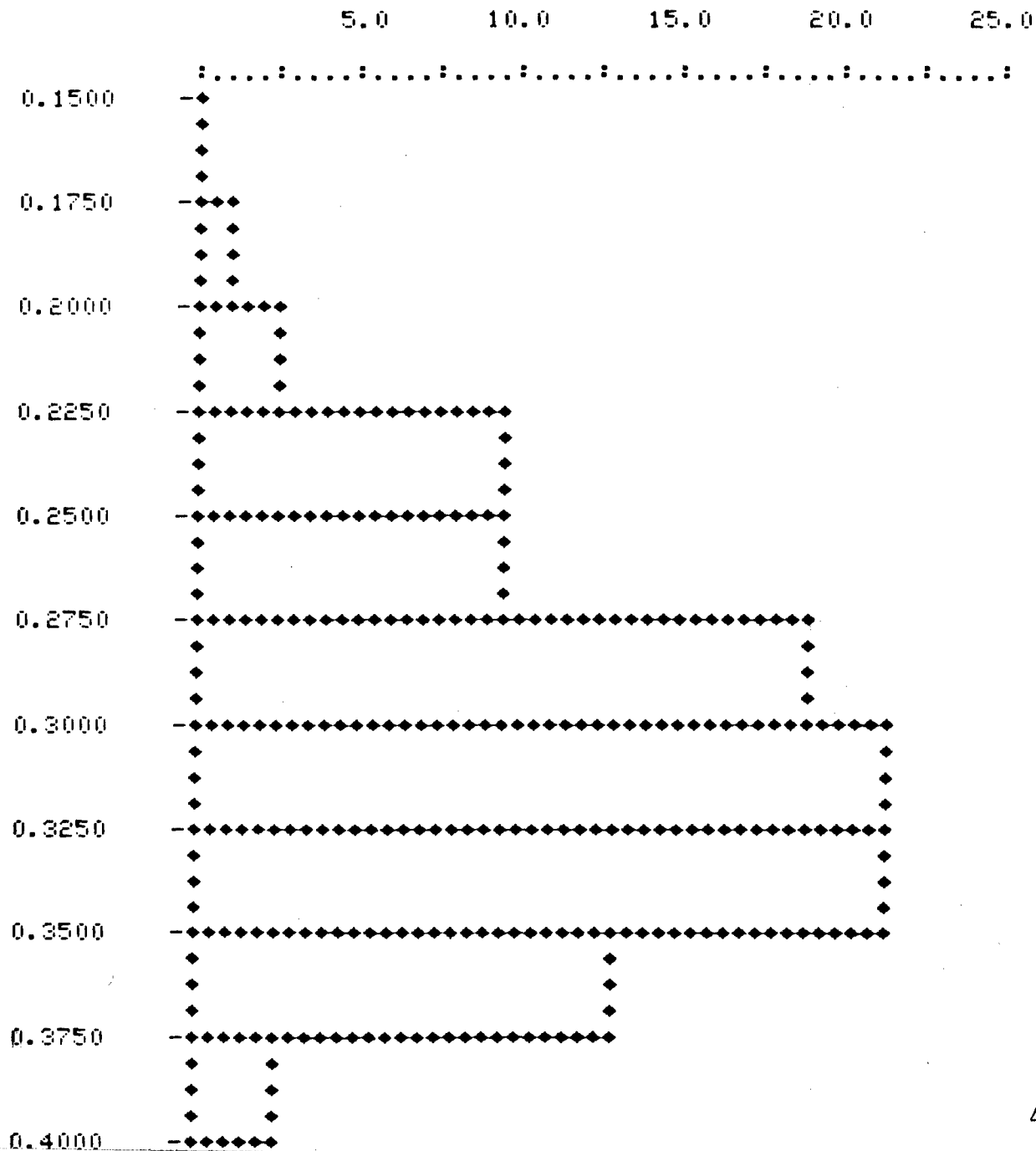
TEMP

```

100 .327,.389,.325,.357,.357,.343
110 .245,.282,.235,.240,.256,.279
120 .283,.314,.293,.296,.302,.327
130 .345,.345,.333,.329,.325,.308
140 .249,.341,.320,.317,.300,.263
150 .283,.295,.283,.325,.366,.310
160 .347,.380,.350,.302,.340,.351
170 .357,.352,.345,.311,.311,.301
180 .250,.292,.214,.189,.211,.235
190 .298,.270,.247,.260,.271,.279
200 .307,.301,.313,.339,.345,.312
210 .263,.329,.369,.369,.357,.363
220 .238,.241,.285,.259,.259,.280
230 .320,.283,.311,.305,.291,.339

```

(a2) The histogram of wear measurements for all precured retread tires.

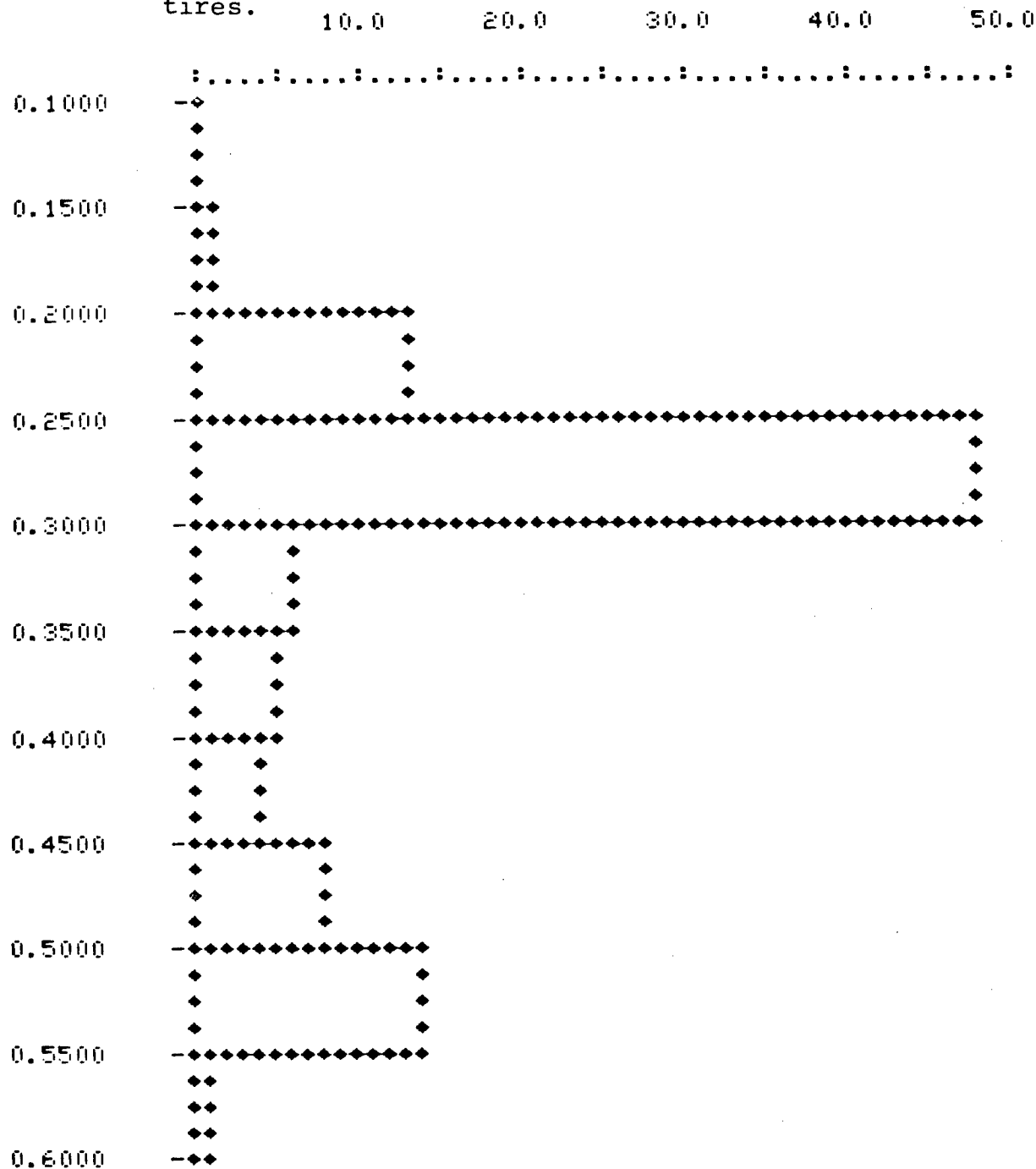


(a3) The wear measurements (file TEMP 2) for all conventional retread tires.

TEMP2

100	.269	.259	.256	.253	.246	.248
110	.300	.289	.263	.273	.235	.274
120	.359	.412	.415	.435	.541	.532
130	.352	.342	.304	.343	.360	.374
140	.284	.267	.291	.299	.265	.284
150	.476	.530	.534	.528	.501	.495
160	.274	.277	.268	.189	.298	.276
170	.290	.278	.260	.274	.244	.259
180	.252	.234	.268	.281	.277	.256
190	.483	.490	.485	.523	.575	.526
200	.292	.267	.225	.233	.304	.299
210	.291	.281	.281	.238	.285	.268
220	.516	.524	.506	.532	.496	.496
230	.266	.255	.235	.245	.244	.255

(a4) The histogram of wear measurements for all conventional retread tires.



(a5) The basic statistics of wear measurements for all conventional retread tires.

MEAN= .304139
STD. DEV. (CORRECTED)= 4.24819E-02

THE HYPOTHESIS THAT THE POPULATION IS NORMAL OF MEAN .304139 AND STD. DEV. 4.24819E-02 CANNOT BE REJECTED AT THE 95% CONFIDENCE LEVEL

K-S STATISTIC = 5.56744E-02
PROBABILITY OF A K-S VALUE OF 0.055674 OR LARGER IS .9570

(a6) The comparison of wear measurements between all precured and conventional retread tires.

STATISTIC	PRECURED SAMPLE	CONVENTIONAL SAMPLE
SAMPLE MEAN	0.3041429	0.3376071
SAMPLE VARIANCE	0.1783241E-02	0.1147288E-01
SAMPLE STD DEVIATION	0.4222844E-01	0.1071115
SAMPLE SIZE	84	84
POPULATION SIZE	INFINITE	INFINITE
ESTIM POPN STD DEV	0.4248207E-01	0.1077549
STD ERROR OF MEAN	0.4635174E-02	0.1175702E-01
DIFF BETWEEN MEANS	-0.3346429E-01	
STD ERROR OF DIFF	0.1263773E-01	
T-RATIO	-2.648	
DEGR OF FREEDOM [DIFF]	108.193	

2-SIDED PROBABILITY THAT A DIFFERENCE AS LARGE AS THE OBSERVED VALUE 34642E-01 IS OBSERVED WHEN NO "TRUE EFFECTS" ARE ACTING ON THE DIFF: .0093104

CONFIDENCE LIMITS ON DIFFERENCE BETWEEN MEANS:

CONFIDENCE LEVEL	LOWER LIMIT	UPPER LIMIT
50.000	-0.4201491E-01	-0.2491366E-01
75.000	-0.4808070E-01	-0.1884787E-01
90.000	-0.5443136E-01	-0.1249721E-01
95.000	-0.5851446E-01	-0.8414107E-02
98.000	-0.6330668E-01	-0.3621895E-02
99.000	-0.6660194E-01	-0.3266297E-03
99.900	-0.7621647E-01	0.9287897E-02

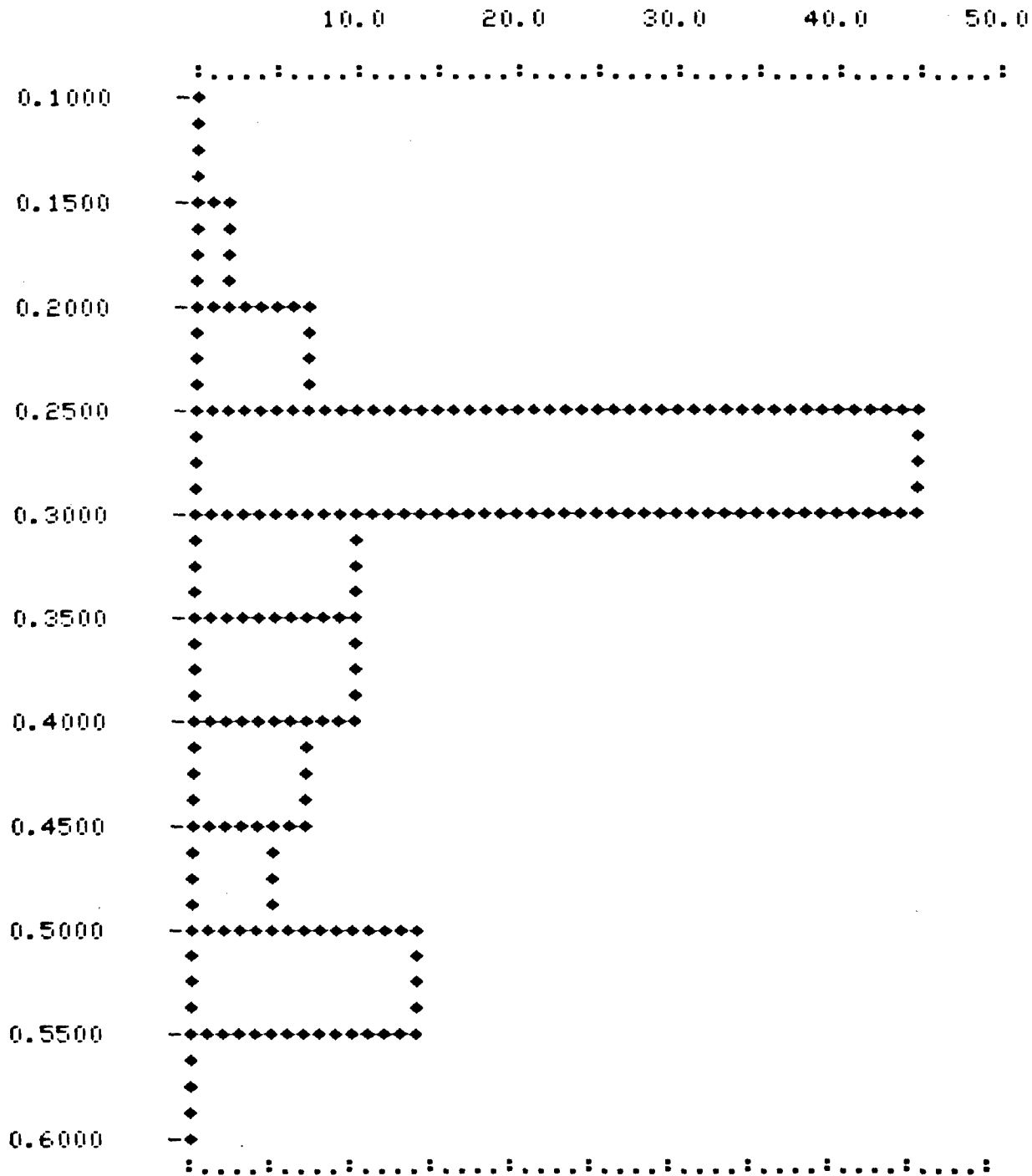
(b1) The wear measurements at point B of all conventional retread tires

CM9E

100 .269,.259,.256,.253,.246,.248
110 .300,.289,.263,.273,.235,.274
120 .359,.412,.415,.435,.541,.532
130 .352,.342,.304,.343,.360,.374
140 .284,.267,.291,.299,.265,.284
150 .476,.530,.534,.528,.501,.495
160 .274,.277,.268,.189,.298,.276

(b2) The histogram of wear measurements at point B of all conventional retread tires.

R E L A T I V E F R E Q U E N C Y



(b3) The wear measurements at point B of all precured retread tires.

PM98

100 .327,.389,.325,.357,.357,.343
110 .245,.282,.235,.240,.256,.279
120 .283,.314,.293,.296,.302,.327
130 .345,.345,.333,.329,.325,.308
140 .249,.341,.320,.317,.300,.263
150 .283,.295,.283,.325,.366,.310
160 .347,.380,.350,.302,.340,.351

(b4) The basic statistics of wear measurements at point B of all precured retread tires.

MEAN= .313261
STD. DEV. (CORRECTED)= 3.79589E-02

THE HYPOTHESIS THAT THE POPULATION IS NORMAL OF MEAN .313261 AND
STD. DEV. 3.79589E-02 CANNOT BE REJECTED AT THE 95% CONFIDENCE LEVEL

K-S STATISTIC = 7.38015E-02
PROBABILITY OF A K-S VALUE OF 0.073801 OR LARGER IS .9762

(b5) The comparison of wear measurements at point B between all precured and conventional retread tires.

STATISTIC	PRECURED SAMPLE	CONVENTIONAL SAMPLE
SAMPLE MEAN	0.3132619	0.3397619
SAMPLE VARIANCE	0.1406574E-02	0.9880800E-02
SAMPLE STD DEVIATION	0.3750432E-01	0.9940221E-01
SAMPLE SIZE	42	42
POPULATION SIZE	INFINITE	INFINITE
ESTIM POPN STD DEV	0.3795894E-01	0.1006071
STD ERROR OF MEAN	0.5857191E-02	0.1552402E-01
DIFF BETWEEN MEANS	-0.2650000E-01	
STD ERROR OF DIFF	0.1659222E-01	
T-RATIO	-1.597	
DEGR OF FREEDOM (DIFF)	52.441	

2-SIDED PROBABILITY THAT A DIFFERENCE AS LARGE AS THE OBSERVED VALUE
65000E-01 IS OBSERVED WHEN NO "TRUE EFFECTS" ARE ACTING ON THE DIFF:
.1162957

CONFIDENCE LIMITS ON DIFFERENCE BETWEEN MEANS:

CONFIDENCE LEVEL	LOWER LIMIT	UPPER LIMIT
---------------------	----------------	----------------

50.000	-0.3776446E-01	-0.1523554E-01
75.000	-0.4580246E-01	-0.7197539E-02
90.000	-0.5428681E-01	0.1286814E-02
95.000	-0.5979473E-01	0.6794729E-02
98.000	-0.6632506E-01	0.1332506E-01
99.000	-0.7086318E-01	0.1786318E-01
99.900	-0.8436853E-01	0.3136853E-01

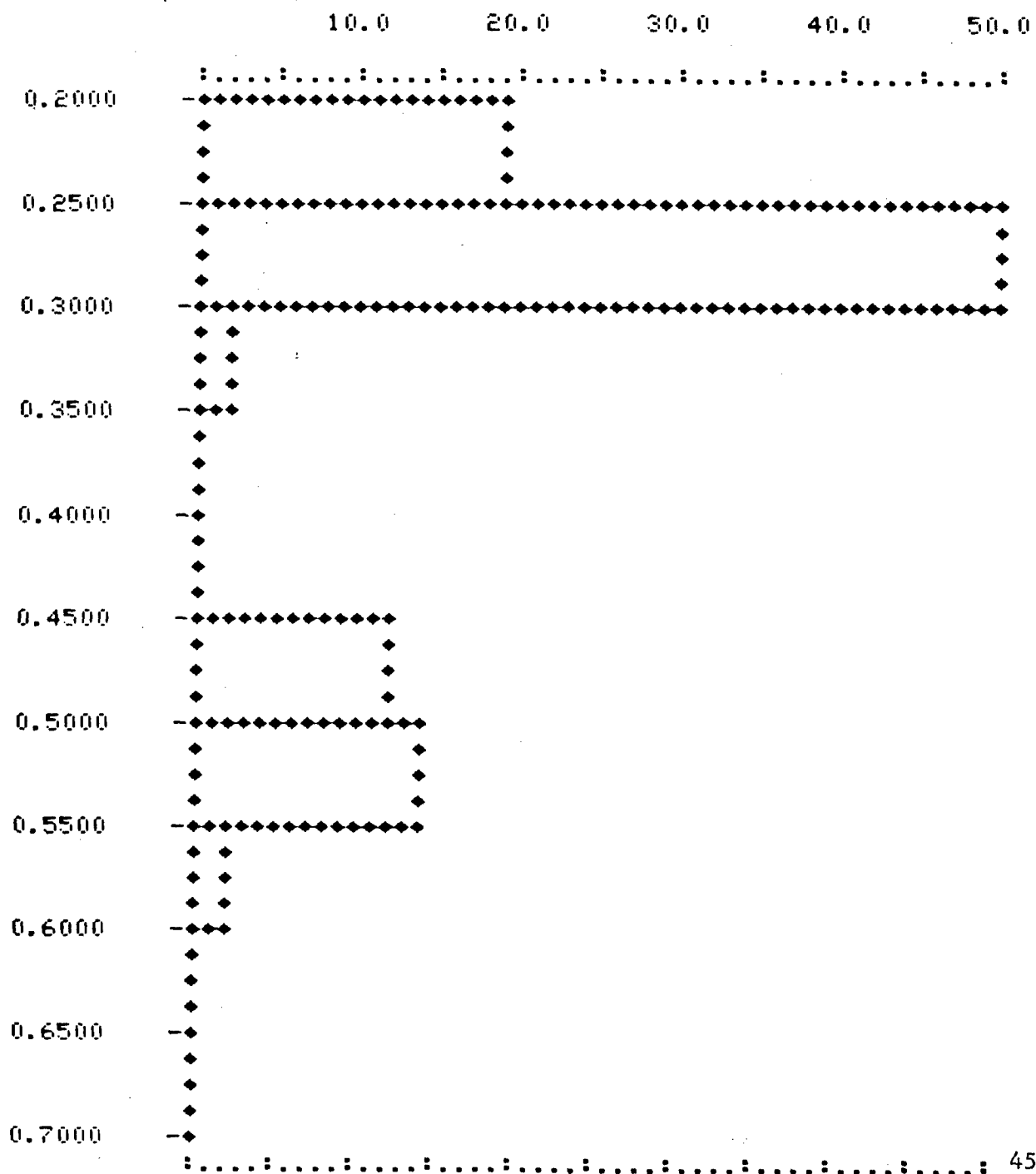
(c1) The wear measurements at point C of all conventional retread tires.

CM90

100 .290,.278,.260,.274,.244,.259
 110 .252,.234,.268,.281,.277,.256
 120 .483,.490,.485,.523,.575,.526
 130 .292,.267,.225,.233,.304,.299
 140 .291,.281,.281,.238,.285,.268
 150 .516,.524,.506,.532,.496,.496
 160 .266,.255,.235,.245,.244,.255

(c2) The histogram of wear measurements at point C of all conventional retread tires.

RELATIVE FREQUENCY



(c3) The wear measurements at point C of all precured retread tires.

PM90

100 .357,.352,.345,.311,.311,.301
110 .250,.292,.214,.189,.211,.235
120 .298,.270,.247,.260,.271,.279
130 .307,.301,.313,.339,.345,.312
140 .283,.329,.369,.369,.357,.363
150 .238,.241,.285,.259,.259,.280
160 .320,.283,.311,.305,.291,.339

(c4) The basic statistics of wear measurements at point C of all precured retread tires.

MEAN= .295023

STD. DEV. (CORRECTED)= 4.51908E-02

THE HYPOTHESIS THAT THE POPULATION IS NORMAL OF MEAN .295023 AND STD. DEV. 4.51908E-02 CANNOT BE REJECTED AT THE 95% CONFIDENCE LEVEL

K-S STATISTIC = 6.01023E-02

PROBABILITY OF A K-S VALUE OF 0.060102 OR LARGER IS .9981

(c5) The comparison of wear measurements at point C between all precured and conventional retread tires.

STATISTIC	PRECURED SAMPLE	CONVENTIONAL SAMPLE
SAMPLE MEAN	0.2950238	0.3354524
SAMPLE VARIANCE	0.1993595E-02	0.1305568E-01
SAMPLE STD DEVIATION	0.4464969E-01	0.1142614
SAMPLE SIZE	42	42
POPULATION SIZE	INFINITE	INFINITE
ESTIM POPN STD DEV	0.4519092E-01	0.1156465
STD ERROR OF MEAN	0.6973110E-02	0.1784464E-01
DIFF BETWEEN MEANS	-0.4042857E-01	
STD ERROR OF DIFF	0.1915869E-01	
T-RATIO	-2.110	
DEGR OF FREEDOM (DIFF)	53.236	

2-SIDED PROBABILITY THAT A DIFFERENCE AS LARGE AS THE OBSERVED VALUE 04285E-01 IS OBSERVED WHEN NO "TRUE EFFECTS" ARE ACTING ON THE DIFF: .0395789

CONFIDENCE LIMITS ON DIFFERENCE BETWEEN MEANS:

CONFIDENCE LEVEL	LOWER LIMIT	UPPER LIMIT
50.000	-0.5344336E-01	-0.2741379E-01
75.000	-0.6271196E-01	-0.1814518E-01
90.000	-0.7250244E-01	-0.8354699E-02
95.000	-0.7885604E-01	-0.2001105E-02
98.000	-0.8638624E-01	0.5529097E-02
99.000	-0.9161719E-01	0.1076005E-01
99.900	-0.1071732	0.2631602E-01

(d1) The wear measurements at point B of precured retread tire 3

PM9T3B

100 .327,.389,.325,.357,.357,.343

(d2) The wear measurements at point B of conventional retread tire 3

CM9T3B

100 .269,.259,.256,.253,.246,.248

(d3) The comparison between the above two sets of data

STATISTIC	PRECURED SAMPLE	CONVENTIONAL SAMPLE
SAMPLE MEAN	0.3496667	0.2551667
SAMPLE VARIANCE	0.4702222E-03	0.5780555E-04
SAMPLE STD DEVIATION	0.2168461E-01	0.7602996E-02
SAMPLE SIZE	6	6
POPULATION SIZE	INFINITE	INFINITE
ESTIM POPN STD DEV	0.2375430E-01	0.8328665E-02
STD ERROR OF MEAN	0.9697651E-02	0.3400163E-02
DIFF BETWEEN MEANS	0.9450000E-01	
STD ERROR OF DIFF	0.1027646E-01	
T-RATIO		9.196
DEGR OF FREEDOM [DIFF]		6.211

2-SIDED PROBABILITY THAT A DIFFERENCE AS LARGE AS THE OBSERVED VALUE
45000E-01 IS OBSERVED WHEN NO "TRUE EFFECTS" ARE ACTING ON THE DIFF:
.0000932

CONFIDENCE LIMITS ON DIFFERENCE BETWEEN MEANS:

CONFIDENCE LEVEL	LOWER LIMIT	UPPER LIMIT
50.000	0.8712569E-01	0.1018743
75.000	0.8141448E-01	0.1075855
90.000	0.7453099E-01	0.1144690
95.000	0.6935442E-01	0.1196456
98.000	0.6220451E-01	0.1267955
99.000	0.5640078E-01	0.1325992
99.900	0.3326451E-01	0.1557355

(e1) The wear measurements at point C of precured retread tire 3

PM9T3C

100 .357,.352,.345,.311,.311,.301

(e2) The wear measurements at point C of conventional retread tire 3

CM9T3C

100 .290,.278,.260,.274,.244,.259

(e3) The comparison between the above two sets of data

STATISTIC	PROCURED SAMPLE	CONVENTIONAL SAMPLE
SAMPLE MEAN	0.3295000	0.2675000
SAMPLE VARIANCE	0.4999167E-03	0.2232500E-03
SAMPLE STD DEVIATION	0.2235882E-01	0.1494155E-01
SAMPLE SIZE	6	6
POPULATION SIZE	INFINITE	INFINITE
ESTIM POPN STD DEV	0.2449286E-01	0.1636765E-01
STD ERROR OF MEAN	0.9999167E-02	0.6682065E-02
DIFF BETWEEN MEANS	0.6200000E-01	
STD ERROR OF DIFF	0.1202636E-01	
T-RATIO		5.155
DEGR OF FREEDOM (DIFF)		8.723

2-SIDED PROBABILITY THAT A DIFFERENCE AS LARGE AS THE OBSERVED VALUE
20000E-01 IS OBSERVED WHEN NO "TRUE EFFECTS" ARE ACTING ON THE DIFF:
.0008686

CONFIDENCE LIMITS ON DIFFERENCE BETWEEN MEANS:

CONFIDENCE LEVEL	LOWER LIMIT	UPPER LIMIT
50.000	0.5350404E-01	0.7049595E-01
75.000	0.4708348E-01	0.7691652E-01
90.000	0.3963641E-01	0.8436359E-01
95.000	0.3426716E-01	0.8973284E-01
98.000	0.2716614E-01	0.9683386E-01
99.000	0.2164690E-01	0.1023531
99.900	0.1371466E-02	0.1226285

(g1) The wear measurements at point C of precured retread tire 4

PM9T4C

100 .250,.292,.214,.189,.211,.235

(g2) The wear measurements at point C of conventional retread tire 4

CM9T4C

100 .252,.234,.268,.281,.277,.256

(g3) The comparison between the above two sets of data

STATISTIC	PRECURED SAMPLE	CONVENTIONAL SAMPLE
SAMPLE MEAN	0.2318333	0.2613333
SAMPLE VARIANCE	0.1091139E-02	0.2565556E-03
SAMPLE STD DEVIATION	0.3303239E-01	0.1601735E-01
SAMPLE SIZE	6	6
POPULATION SIZE	INFINITE	INFINITE
ESTIM POPN STD DEV	0.3618517E-01	0.1754613E-01
STD ERROR OF MEAN	0.1477253E-01	0.7163178E-02
DIFF BETWEEN MEANS	-0.2950000E-01	
STD ERROR OF DIFF	0.1641764E-01	
T-RATIO	-1.797	
DEGR OF FREEDOM (DIFF)	7.228	

2-SIDED PROBABILITY THAT A DIFFERENCE AS LARGE AS THE OBSERVED VALUE
95000E-01 IS OBSERVED WHEN NO "TRUE EFFECTS" ARE ACTING ON THE DIFF:
.1154156

CONFIDENCE LIMITS ON DIFFERENCE BETWEEN MEANS:

CONFIDENCE LEVEL	LOWER LIMIT	UPPER LIMIT
50.000	-0.4117607E-01	-0.1782393E-01
75.000	-0.5009230E-01	-0.8907701E-02
90.000	-0.6060451E-01	0.1604510E-02
95.000	-0.6832155E-01	0.9321550E-02
98.000	-0.7871929E-01	0.1971929E-01
99.000	-0.8695326E-01	0.2795326E-01
99.900	-0.1182846	0.5928464E-01

(h1) The wear measurements at point B of precured retread tire 6

PM9T6B

100 .283,.314,.293,.296,.302,.327

(h2) The wear measurements at point B of conventional retread tire 6

CM9T6B

100 .359,.412,.415,.435,.541,.532

(h3) The comparison between the above two sets of data

STATISTIC	PRECURED SAMPLE	CONVENTIONAL SAMPLE
SAMPLE MEAN	0.3025000	0.4490000
SAMPLE VARIANCE	0.2075833E-03	0.4362333E-02
SAMPLE STD DEVIATION	0.1440775E-01	0.6604796E-01
SAMPLE SIZE	6	6
POPULATION SIZE	INFINITE	INFINITE
ESTIM POPN STD DEV	0.1578290E-01	0.7235192E-01
STD ERROR OF MEAN	0.6443343E-02	0.2953755E-01
DIFF BETWEEN MEANS	-0.1465000	
STD ERROR OF DIFF	0.3023216E-01	
T-RATIO	-4.846	
DEGR OF FREEDOM [DIFF]	5.475	

2-SIDED PROBABILITY THAT A DIFFERENCE AS LARGE AS THE OBSERVED VALUE

0.1465000 IS OBSERVED WHEN NO "TRUE EFFECTS" ARE ACTING ON THE DIFF:
.0046909

CONFIDENCE LIMITS ON DIFFERENCE BETWEEN MEANS:

CONFIDENCE LEVEL	LOWER LIMIT	UPPER LIMIT
50.000	-0.1684699	-0.1245301
75.000	-0.1858305	-0.1071695
90.000	-0.2074193	-0.8558074E-01
95.000	-0.2242142	-0.6878576E-01
98.000	-0.2482291	-0.4477091E-01
99.000	-0.2684004	-0.2459961E-01
99.900	-0.3541594	0.6115935E-01

(i1) The wear measurements at point C of precured retread tire 6

PM9T6C

100 .298,.270,.247,.260,.271,.279

(i2) The wear measurements at point C of conventional retread tire 6

CM9T6C

100 .483,.490,.485,.523,.575,.526

(i3) The comparison between the above two sets of data

STATISTIC	PRECURED SAMPLE	CONVENTIONAL SAMPLE
SAMPLE MEAN	0.2708333	0.5136667
SAMPLE VARIANCE	0.2484722E-03	0.1053889E-02
SAMPLE STD DEVIATION	0.1576300E-01	0.3246365E-01
SAMPLE SIZE	6	6
POPULATION SIZE	INFINITE	INFINITE
ESTIM POPN STD DEV	0.1726750E-01	0.3556215E-01
STD ERROR OF MEAN	0.7049428E-02	0.1451819E-01
DIFF BETWEEN MEANS	-0.2428333	
STD ERROR OF DIFF	0.1613915E-01	
T-RATIO	-15.046	
DEGR OF FREEDOM [DIFF]	7.234	

2-SIDED PROBABILITY THAT A DIFFERENCE AS LARGE AS THE OBSERVED VALUE

0.2428333 IS OBSERVED WHEN NO "TRUE EFFECTS" ARE ACTING ON THE DIFF:
.0000014

CONFIDENCE LIMITS ON DIFFERENCE BETWEEN MEANS:

CONFIDENCE LEVEL	LOWER LIMIT	UPPER LIMIT
50.000	-0.2543113	-0.2313553
75.000	-0.2630763	-0.2225903
90.000	-0.2734102	-0.2122564
95.000	-0.2809964	-0.2046703
98.000	-0.2912177	-0.1944489
99.000	-0.2993120	-0.1863546
99.900	-0.3301119	-0.1555547

(j1) The wear measurements at point B of precured retread tire 7

PM9T7B

100 .345,.345,.333,.329,.325,.308

(j2) The wear measurements at point B of conventional retread tire 7

CM9T7B

100 .352,.342,.304,.343,.360,.374

(j3) The comparison between the above two sets of data

STATISTIC	PRECURED SAMPLE	CONVENTIONAL SAMPLE
SAMPLE MEAN	0.3308333	0.3458333
SAMPLE VARIANCE	0.1608056E-03	0.4674722E-03
SAMPLE STD DEVIATION	0.1268091E-01	0.2162111E-01
SAMPLE SIZE	6	6
POPULATION SIZE	INFINITE	INFINITE
ESTIM POPN STD DEV	0.1389124E-01	0.2368474E-01
STD ERROR OF MEAN	0.5671077E-02	0.9669253E-02
DIFF BETWEEN MEANS	-0.1500000E-01	
STD ERROR OF DIFF	0.1120962E-01	
T-RATIO		-1.338
DEGR OF FREEDOM [DIFF]		8.076

8880DEB0BROB8ABBBERYETHH888A B0FFERBBCEFRACI8R6BRBSAOMENBB8BRYBB 8888E
.2176371

CONFIDENCE LIMITS ON DIFFERENCE BETWEEN MEANS:

CONFIDENCE LEVEL	LOWER LIMIT	UPPER LIMIT
50.000	-0.2291897E-01	-0.7081026E-02
75.000	-0.2890350E-01	-0.1096501E-02
90.000	-0.3584482E-01	0.5844826E-02
95.000	-0.4084943E-01	0.1084943E-01
98.000	-0.4746820E-01	0.1746821E-01
99.000	-0.5261261E-01	0.2261262E-01
99.900	-0.7151109E-01	0.4151110E-01

(k1) The wear measurements at point C of precured retread tire 7

PM9T7C

100 .307,.301,.313,.339,.345,.312

(k2) The wear measurements at point C of conventional retread tire 7

CM9T7C

100 .292,.267,.225,.233,.304,.299

(k3) The comparison between the above two sets of data

STATISTIC	PRECURED SAMPLE	CONVENTIONAL SAMPLE
SAMPLE MEAN	0.3195000	0.2700000
SAMPLE VARIANCE	0.2712500E-03	0.9806666E-03
SAMPLE STD DEVIATION	0.1646967E-01	0.3131560E-01
SAMPLE SIZE	6	6
POPULATION SIZE	INFINITE	INFINITE
ESTIM POPN STD DEV	0.1804162E-01	0.3430452E-01
STD ERROR OF MEAN	0.7365460E-02	0.1400476E-01
DIFF BETWEEN MEANS	0.4950000E-01	
STD ERROR OF DIFF	0.1582351E-01	
T-RATIO		3.128
DEGR OF FREEDOM [DIFF]		7.569

2-SIDED PROBABILITY THAT A DIFFERENCE AS LARGE AS THE OBSERVED VALUE
95000E-01 IS OBSERVED WHEN NO "TRUE EFFECTS" ARE ACTING ON THE DIFF:
.0166502

CONFIDENCE LIMITS ON DIFFERENCE BETWEEN MEANS:

CONFIDENCE LEVEL	LOWER LIMIT	UPPER LIMIT
50.000	0.3824647E-01	0.6075353E-01
75.000	0.2965291E-01	0.6934709E-01
90.000	0.1952112E-01	0.7947887E-01
95.000	0.1208335E-01	0.8691665E-01
98.000	0.2061897E-02	0.9693810E-01
99.000	-0.5874097E-02	0.1048741
99.900	-0.3607163E-01	0.1350716

(11) The wear measurements at point B of precured retread tire 8

PM9T8B

100 .249,.341,.320,.317,.300,.263

(12) The wear measurements at point B of conventional retread tire 8

CM9T8B

100 .284,.267,.291,.297,.265,.284

(13) The comparison between the above two sets of data

STATISTIC	PRECURED SAMPLE	CONVENTIONAL SAMPLE
SAMPLE MEAN	0.2983333	0.2813333
SAMPLE VARIANCE	0.1053889E-02	0.1375556E-03
SAMPLE STD DEVIATION	0.3246365E-01	0.1172841E-01
SAMPLE SIZE	6	6
POPULATION SIZE	INFINITE	INFINITE
ESTIM POPN STD DEV	0.3556215E-01	0.1284783E-01
STD ERROR OF MEAN	0.1451819E-01	0.5245104E-02
DIFF BETWEEN MEANS	0.1700000E-01	
STD ERROR OF DIFF	0.1543661E-01	
T-RATIO		1.101
DEGR OF FREEDOM (DIFF)		6.283

2080DEB08R08A8B8B8E8V8D8H8E8A B08F8B8C8E8F8E8C8B8G8B8S8A8M8E8N8B8B8Y8B8 W8E8E
.3129823

CONFIDENCE LIMITS ON DIFFERENCE BETWEEN MEANS:

CONFIDENCE LEVEL	LOWER LIMIT	UPPER LIMIT
50.000	0.5922801E-02	0.2807720E-01
75.000	-0.2656197E-02	0.3665620E-01
90.000	-0.1299611E-01	0.4699611E-01
95.000	-0.2077202E-01	0.5477202E-01
98.000	-0.3151214E-01	0.6551214E-01
99.000	-0.4023012E-01	0.7423012E-01
99.900	-0.7498388E-01	0.1089839

(m1) The wear measurements at point C of precured retread tire 8

PM9T8C

100 .283,.329,.369,.369,.357,.363

(m2) The wear measurements at point C of conventional retread tire 8

CM9T8C

100 .291,.281,.281,.238,.285,.268

(m3) The comparison between the above two sets of data

STATISTIC	PRECURED SAMPLE	CONVENTIONAL SAMPLE
SAMPLE MEAN	0.3450000	0.2740000
SAMPLE VARIANCE	0.9533333E-03	0.3066666E-03
SAMPLE STD DEVIATION	0.3087610E-01	0.1751190E-01
SAMPLE SIZE	6	6
POPULATION SIZE	INFINITE	INFINITE
ESTIM POPN STD DEV	0.3382307E-01	0.1918333E-01
STD ERROR OF MEAN	0.1380821E-01	0.7831560E-02
DIFF BETWEEN MEANS	0.7100000E-01	
STD ERROR OF DIFF	0.1587451E-01	
T-RATIO		4.473
DEGR OF FREEDOM [DIFF]		7.915

2-SIDED PROBABILITY THAT A DIFFERENCE AS LARGE AS THE OBSERVED VALUE
10000E-01 IS OBSERVED WHEN NO "TRUE EFFECTS" ARE ACTING ON THE DIFF:
.0028920

CONFIDENCE LIMITS ON DIFFERENCE BETWEEN MEANS:

CONFIDENCE LEVEL	LOWER LIMIT	UPPER LIMIT
50.000	0.5971020E-01	0.8228980E-01
75.000	0.5108894E-01	0.9091106E-01
90.000	0.4092450E-01	0.1010755
95.000	0.3346275E-01	0.1085372
98.000	0.2340900E-01	0.1185910
99.000	0.1544742E-01	0.1265526
99.900	-0.1484744E-01	0.1568474

(n1) The wear measurements at point B of precured retread tire 9

PM9T9B

100 .283,.295,.283,.325,.366,.310

(n2) The wear measurements at point B of conventional retread tire 9

CM9T9B

100 .476,.530,.534,.528,.501,.495

(n3) The comparison between the above two sets of data

STATISTIC	PRECURED SAMPLE	CONVENTIONAL SAMPLE
SAMPLE MEAN	0.3103333	0.5106667
SAMPLE VARIANCE	0.8405555E-03	0.4598888E-03
SAMPLE STD DEVIATION	0.2899234E-01	0.2144502E-01
SAMPLE SIZE	6	6
POPULATION SIZE	INFINITE	INFINITE
ESTIM POPN STD DEV	0.3175951E-01	0.2349184E-01
STD ERROR OF MEAN	0.1296577E-01	0.9590504E-02
DIFF BETWEEN MEANS	-0.2003333	
STD ERROR OF DIFF	0.1612727E-01	
T-RATIO	-12.422	
DEGR OF FREEDOM (DIFF)	9.211	

2-SIDED PROBABILITY THAT A DIFFERENCE AS LARGE AS THE OBSERVED VALUE

0.2003333 IS OBSERVED WHEN NO "TRUE EFFECTS" ARE ACTING ON THE DIFF:
.0000006

CONFIDENCE LIMITS ON DIFFERENCE BETWEEN MEANS:

CONFIDENCE LEVEL	LOWER LIMIT	UPPER LIMIT
50.000	-0.2116673	-0.1889994
75.000	-0.2201644	-0.1805023
90.000	-0.2298964	-0.1707702
95.000	-0.2368158	-0.1638509
98.000	-0.2458354	-0.1548312
99.000	-0.2527443	-0.1479224
99.900	-0.2774364	-0.1232303

(o1) The wear measurements at point C of precured retread tire 9

PM9T9C

100 .238,.241,.285,.259,.259,.280

(o2) The wear measurements at point C of conventional retread tire 9

CM9T9C

100 .516,.524,.506,.532,.496,.496

(o3) The comparison between the above two sets of data

STATISTIC	PRECURED SAMPLE	CONVENTIONAL SAMPLE
SAMPLE MEAN	0.2603333	0.5116667
SAMPLE VARIANCE	0.3118889E-03	0.1845555E-03
SAMPLE STD DEVIATION	0.1766038E-01	0.1358512E-01
SAMPLE SIZE	6	6
POPULATION SIZE	INFINITE	INFINITE
ESTIM POPN STD DEV	0.1934597E-01	0.1488176E-01
STD ERROR OF MEAN	0.7897960E-02	0.6075451E-02
DIFF BETWEEN MEANS	-0.2513333	
STD ERROR OF DIFF	0.9964380E-02	
T-RATIO	-25.223	
DEGR OF FREEDOM (DIFF)	9.383	

2-SIDED PROBABILITY THAT A DIFFERENCE AS LARGE AS THE OBSERVED VALUE

0.2513333 IS OBSERVED WHEN NO "TRUE EFFECTS" ARE ACTING ON THE DIFF:
.0000000

CONFIDENCE LIMITS ON DIFFERENCE BETWEEN MEANS:

CONFIDENCE LEVEL	LOWER LIMIT	UPPER LIMIT
50.000	-0.2583361	-0.2443306
75.000	-0.2635861	-0.2390805
90.000	-0.2695992	-0.2330675
95.000	-0.2738743	-0.2287923
98.000	-0.2794472	-0.2232195
99.000	-0.2837159	-0.2189507
99.900	-0.2989722	-0.2036945

(p1) The wear measurements at point B of precured retread tire 10

PM9T10B

100 .347,.380,.350,.302,.340,.351

(p2) The wear measurements at point B of conventional retread tire 10

CM9T10B

100 .274,.277,.268,.189,.298,.276

(p3) The comparison between the above two sets of data

STATISTIC	PRECURED SAMPLE	CONVENTIONAL SAMPLE
SAMPLE MEAN	0.3450000	0.2636667
SAMPLE VARIANCE	0.5273334E-03	0.1201555E-02
SAMPLE STD DEVIATION	0.2296374E-01	0.3466346E-01
SAMPLE SIZE	6	6
POPULATION SIZE	INFINITE	INFINITE
ESTIM POPN STD DEV	0.2515552E-01	0.3797192E-01
STD ERROR OF MEAN	0.1026970E-01	0.1550197E-01
DIFF BETWEEN MEANS	0.8133333E-01	
STD ERROR OF DIFF	0.1859510E-01	
T-RATIO		4.374
DEGR OF FREEDOM [DIFF]		8.680

2-SIDED PROBABILITY THAT A DIFFERENCE AS LARGE AS THE OBSERVED VALUE
13333E-01 IS OBSERVED WHEN NO "TRUE EFFECTS" ARE ACTING ON THE DIFF:
.0023680

CONFIDENCE LIMITS ON DIFFERENCE BETWEEN MEANS:

CONFIDENCE LEVEL	LOWER LIMIT	UPPER LIMIT
50.000	0.6819693E-01	0.9446974E-01
75.000	0.5826949E-01	0.1043972
90.000	0.4675485E-01	0.1159118
95.000	0.3845295E-01	0.1242137
98.000	0.2747338E-01	0.1351933
99.000	0.1893957E-01	0.1437271
99.900	-0.1241022E-01	0.1750769

(q1) The wear measurements at point C of precured retread tire 10

PM9T10C

100 .320,.283,.311,.305,.291,.339

(q2) The wear measurements at point C of conventional retread tire 10

CM9T10C

100 .266,.255,.235,.245,.244,.255

(q3) The comparison between the above two sets of data

STATISTIC	PRECURED SAMPLE	CONVENTIONAL SAMPLE
SAMPLE MEAN	0.3081667	0.2500000
SAMPLE VARIANCE	0.3394722E-03	0.9866666E-04
SAMPLE STD DEVIATION	0.1842477E-01	0.9933109E-02
SAMPLE SIZE	6	6
POPULATION SIZE	INFINITE	INFINITE
ESTIM POPN STD DEV	0.2018333E-01	0.1088118E-01
STD ERROR OF MEAN	0.8239808E-02	0.4442222E-02
DIFF BETWEEN MEANS	0.5816667E-01	
STD ERROR OF DIFF	0.9360971E-02	
T-RATIO		6.214
DEGR OF FREEDOM [DIFF]		7.680

2-SIDED PROBABILITY THAT A DIFFERENCE AS LARGE AS THE OBSERVED VALUE
81666E-01 IS OBSERVED WHEN NO "TRUE EFFECTS" ARE ACTING ON THE DIFF:
.0004393

CONFIDENCE LIMITS ON DIFFERENCE BETWEEN MEANS:

CONFIDENCE LEVEL	LOWER LIMIT	UPPER LIMIT
50.000	0.5150923E-01	0.6482410E-01
75.000	0.4642540E-01	0.6990793E-01
90.000	0.4043157E-01	0.7590176E-01
95.000	0.3603149E-01	0.8030184E-01
98.000	0.3010293E-01	0.8623040E-01
99.000	0.2540810E-01	0.9092523E-01
99.900	0.7543653E-02	0.1087897

UNCLASSIFIED

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER 12451	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) RECAPPED TIRE COMPARISON		5. TYPE OF REPORT & PERIOD COVERED FINAL TECHNICAL REPORT 11/2/78 thru 4/27/79
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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) A TEST PROGRAM HAS BEEN CONDUCTED TO COMPARE THE WEAR CHARACTERISTICS OF CONVENTIONAL RETREAD AND PRECURED RETREAD 9:00 X 20 TIRES. AN M-35 2 1/2 TON TRUCK WITH A 5000# HIGHWAY LOAD WAS DRIVEN 9000 MILES ON A COMBINATION OF PAVED, SECONDARY AND CROSS COUNTRY SURFACED ROADS WITH EACH TYPE OF RETREAD TIRE IN THIS EVALUATION. THE PRECURED RETREAD TIRES EXHIBITED ABOUT 10% LESS WEAR THAN THE CONVENTIONAL RETREAD TIRES ON THIS TEST BASED ON SAMPLE MEANS. THE PRECURED TIRES WERE ALSO MORE CONSISTENT IN WEAR RESISTANCE.		

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